FOOD INDUSTRIES

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Facing the Unsolvable

WHEN we were young we studied mathematical problems to which there was always a correct answer. Sometimes we were even given a book of answers, and thus was developed in our minds the idea that every problem has a correct solution. Yet mathematics itself has plenty of unsolvable problems; and life itself is full of seemingly unsolvable problems. Man temporizes, dallies, readjusts, muddles along—but many problems are never really solved, and we doubt very much if they ever can be.

● RIGHT NOW domestic business is faced with one of these in the nature of competition from imports from countries operating on depreciated currencies, where, up to now, production costs have not increased in accordance with expectations but remain at unprecedentedly low figures. Tariff protection such as we now possess is no obstacle whatsoever in preventing a flood of foreign, low-priced goods from underselling our domestic manufacturers. Under the law most of this cannot be construed as dumping, and under the provisions of the flexible tariff act the law permits only a 50-per cent increase in the customs duty, after lengthy examinations by the Tariff Commission. In most of these cases the regular duty plus the 50-per cent increase in duty is wholly inadequate to protect American price levels.

● FREQUENTLY coupled with this problem is the matter of intergovernmental debts. Any student of public affairs can build up an excellent case for either side of the problem. It can be proved to be equally necessary from our national viewpoint: to demand payment, and to forego payment; to raise tariffs, and to lower tariffs; to practice dumping abroad, and to forbid dumping in the United States.

● LET US NOT delude ourselves into a belief that there exists a happy, clear-cut solution. Also to be avoided is the belief that any individual can exert influence for good in national or industrial affairs without thinking these problems all the way through, nationally and internationally. A selfish, short-sighted viewpoint, although perfectly understandable, is most unfortunate.

● WE ARE definitely opposed to tariff tinkering in the next Congress. The Hawley-Smoot tariff was a mistake, but now that business is somewhat adjusted to it we believe it would be a worse mistake to reduce it. The awful results of tariff tinkering in 1913 are still very vivid in the editorial memory. Business can readjust itself to its debts more easily than it can to a revised tariff and price structure. However, it is highly desirable that the United States be given some form of protection from depreciated currencies and low foreign production costs.

● INTERGOVERNMENTAL debts may as well be regarded as extremely bad debts. Any attempt at full collection of these debts involves either lowering of tariffs to permit a flood of imports or forcing the debtor nations to default. In either case we, nationally speaking, are the losers.

● PAYMENT through imports invites ruin to ourselves. Why go bankrupt? Forcing debtor nations to default will not retire the direct obligations of our government which were given us in return for our savings when these loans were made to the allied nations during the War. In case of default by our debtors, these obligations can be met only by taxing ourselves. Why force ourselves to meet the whole of these obligations?

● WRITING DOWN the debts is the lesser evil. By so doing we may be able to spread the economic burden so that neither we nor our debtors will be forced into bankruptcy.

● THEN there is the matter of the alleged clamor for Philippine independence. Many believe our pocketbooks would be much better off if there were some way to stem their constantly increasing production of competing commodities, particularly sugar, copra and coconut oil. By many these islands are regarded as a menace to a large body of our industry and agriculture. One is tempted to recommend granting their expressed desire for political freedom, but the problem of national honor also enters at this point. Also we are not entirely certain as to just who wants Philippine independence, particularly when it would be at the cost of probable Philippine bankruptcy. One does not allow a child to eat all the candy he wants, knowing that he will soon be made very ill.

● OUR OPINION is, however, that the first step toward their independence should soon be taken. A moderate import restriction or limit should be imposed on certain Philippine products to permit their producers to adjust themselves gradually to economic conditions that will follow political independence.

● ALTHOUGH these opinions represent the result of much study, no one realizes better than we that this is not the end of our national difficulties. We foresee a continuing set of other difficulties, yet these moves appear to be the readjustments to be made now.

...AS IT LOOKS TO US

President

Everyone, regardless of political faith, will agree that one very satisfactory result of the presidential election is the huge plurality by which Franklin D. Roosevelt was elected. The Democratic party will be in full power and will be able to apply its skill in solving our national problems unhampered. Readers with long memories may recall the episodes of twenty years ago when the first Wilson administration reduced our import tariffs. They may again be apprehensive of the future of tariff legislation.

We are informed however, by advisers of the President-elect that business need not fear a repetition of such wholesale modifications as were enacted in 1913. It is to be hoped that these reassurances will be vindicated by future events. May the coming administration succeed in its hope of restoring the country to a reasonable degree of prosperity!

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Freezing

Rapidity of freezing, the subject of much speculation and loud beating of the tom-toms, to our way of thinking, has been greatly overestimated in its technical importance. The net result is frozen food. It may be of good, bad, or indifferent quality. Elsewhere in this issue is a report of careful research on peach freezing, which shows that extremely low temperatures may be harmful to quality. Rapidity evidently is not the answer to *all* problems.

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What Else?

We were chatting with the head of a well-known Pacific Coast outfit. He opined that buisness men were learning many valuable lessons from depression. What, we asked, were the truths that had come to him as a result of vicissitude. To his observations we have added two more, gleaned from other executives:

1. The exceeding shortness of the memory of man.

2. That one does not always need to put money to work to profit by its possession.

3. That men as well as companies should keep a definite (and comfortably large) percentage of their reserves in easily liquidated securities (government bonds) and cash.

4. That there is no such thing as economic security.

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Bags

A request has come for some method of treating grain bags to prevent their destruction by rats and mice. It is stipulated, however, that the treatment of the sack must not cause the grain to take on an undesirable flavor or odor. Who has it?

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Two-Way

Cooperation always will be needed between sales and production departments, but cooperation is a two-way proposition. Sales departments having a few men who have had factory experience make fewest impossible demands and anticipate production needs best. And, conversely, the superintendent who has himself called on the trade is less likely to cuss out the sales department for lack of orders or inability to outargue complaints about quality and packing. Exchanging men frequently makes for better understanding.

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Repetition is Reputation

Tremendous intercommodity competition is to be the rule in 1933. Every producer of food is striving for his place on the menu. But no matter how low your prices may be, some other food usually can satisfy hunger at a still lower price.

To maintain a market there is no weapon more effective than advertising. It works for both offense and defense. You may not wish to advertise your wares, but if the other fellow puts the deciding feather in the sensitive balance of public preference, your business suffers.

"Repetition is reputation."

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Tasting

When you call on the gang from the office to taste a product for flavor, beware of the opinion of the man who removes a cigar from his mouth and takes a nibble. His verdict *may* be worth something if all consumers also smoke cigars just before meals.

Also insist that the samplers eat enough to know what they are really eating. Those occasional unpleasant aftertastes are seldom revealed by a nibble. Individual consumer portions should be eaten entirely, if a real reaction is to be obtained. Candy bars, in particular, should be entirely consumed before accepting a favorable verdict. If the taster refuses to be a real taster, he or she should be excluded.

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Conventions

Convention attendance pays a form of dividend, yet much of the value received is not at once measurable in dollars. During the next few months, important sessions are going to be held. The future welfare of your industry may hinge on the actions taken. Many of these conventions will have expositions as well. Executives themselves ought to go; likewise the plant superintendent or head foreman. Industries must have men coming along who know the industry.

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Competition

Recently a business counselor sought our advice regarding his client's business. It happened that we possessed both formulas and chemical analyses of the principal competing products in that field. From these data it was apparent that the client was trying to sell a product, at equal prices, that was not as palatable as his competitors' — an obviously difficult and losing attempt.

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Hazard

Silica dust is extremely hazardous to human health and life when inhaled. Apparently most of the other industrial dusts may be inhaled with impunity, but this one carries with it a certain outcome of diseased lungs, susceptibility to tuberculosis, and even death. There are not many places in food manufacturing establishments where silica dust may become a hazard, but readers should be on their guard against them. Sand-blasting and cleaning up buildings is one place. Drilling holes in concrete possibly is another. An important point which ought to be settled is whether the dusting of concrete floors also constitutes a hazard.

What Is the Proper Floor?

. . . A Big Question

By A. E. HANSEN
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Chicago, Ill.

Here is all that is left of an expensive composition floor that was absolutely unsuited for the service. Hot water and brine have cut through the surface and exposed the underlying concrete.

WHENEVER the question arises as to what is the proper floor surface to use in a given situation, a confusion of answers presents itself. Certain floors ought to be the right ones in certain services, yet actual experience with them has failed to substantiate theory. A floor that was once thought to be ideal is unsatisfactory now. I have found that floors which have been generally conceded to be everlasting can, under certain circumstances and conditions, deteriorate very rapidly and become more worthless than a cheap wooden floor.

Since our own knowledge of floors has been obtained from experience in plants devoted to canning, pickling, meat packing and dairy products manufacture, it should be interpreted as experience with floors in wet manufacturing. In operations where floors must, or ought to be, liquid-tight, the floor performs a double function: It must be capable of supporting whatever load is placed upon it, which is its primary structural purpose; and it must be capable of presenting a good, long-wearing surface, but should be impervious to moisture.

A floor presents a variety of aspects all of which must be adapted to the service demands or the floor is to be regarded as a failure despite the fact that, out of the various factors, strength, drainage, moisture imperviousness, and durability, only one of them may have failed. A floor is properly to be regarded as a structure, not merely a surface.

I recall a rebuilt plant which I once visited where a mastic surface had been laid on one of the upper floors, with all slopes properly directed toward the drains. Afterward, some very heavy bottling machinery had been installed which slowly caused the floor to sag, and after the first few months there was no natural drainage at all. This was because the floor drains had been located close to the floor posts, where sagging was least effective. In that instance the floor was watertight and had proper wearing quality, but it was so much of an aggravation that it was virtually a failure, for it could be cleaned and dried only by means of scoop shovels, squeegees and mops.

Sufficient drains and proper slopes toward them are very important features of floor construction, but unless the structure is adequate to maintain them in that relationship, the floor is a failure. It is impossible to drain a large floor area properly with a single drain, both because of the total fall re-

***Editor's Note*—Recently there came into the hands of the editor a survey of flooring problems which is particularly interesting because it shows that dry manufacturing has the least difficulty with its floors. The results are given below:**

Type of Industry	Number Plants Reporting	Experiences With Floors		Plans for Special Floors		Previous Attempts to Solve Floor Problems		Accidents Due to Faulty Floors in the Past 6 Months	
		Trouble	No Trouble	Yes	No	Yes	No	Yes	No
Canning.....	5	3	1	3	0	3	2	1	4
Meat Packing	3	3	0	3	0	2	1	1	2
Beverage.....	2	1	1	1	1	2	0	0	2
Dairying.....	6	6	0	5	1	5	1	0	6
Baking.....	2	0	2	0	2	0	2	0	2
Confectionery	2	0	2	0	2	0	2	0	2
Miscellaneous	5	4	1	4	1	4	1	0	5
Totals.....	25	17	7	16	7	16	9	2	23

quired and because of the interference with the drainage by pieces of equipment located between the high points and the drain itself.

A permanent floor improperly laid is a source of regret every day it is used, and where a few minutes more time and care could have made it perfect, the neglect and carelessness in its construction will entail hours of needless work year after year. Concrete floors where the drain is at the highest point illustrate this feature, and likewise others in which the floor is level except for a tiny area immediately surrounding the drain, where it resembles a soup bowl.

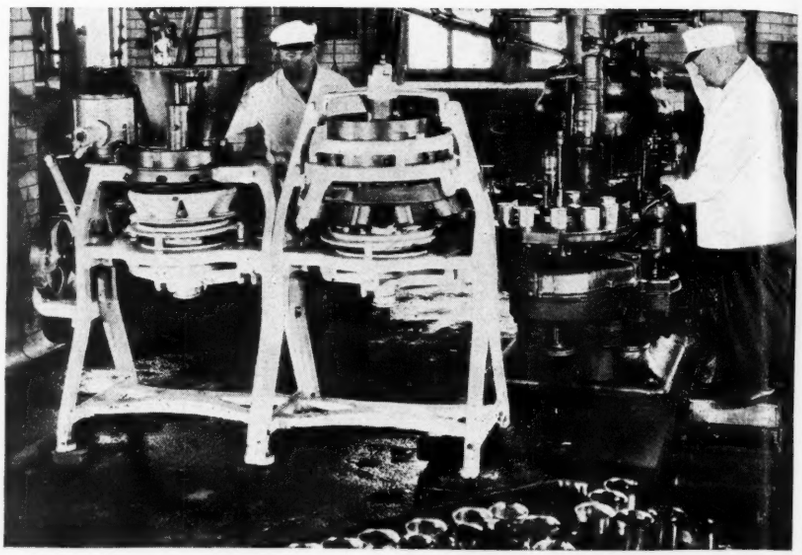
In other cases, floor drains have been placed for the convenience of the plumber and not for the convenience of plant operation. The same care ought to be given to laying out a floor and its drains as is given to laying out an irrigation system, and under such conditions, given the right floor surface, there should be obtained an almost perfect floor. Like an irrigation system, too much fall is undesirable and too little is ineffective.

In putting in a new floor for general manufacturing operations, exclusive of warehouses, storerooms and offices, there is no better material than cement, stone and sand, reinforced with steel. Such a floor, however, is not indestructible, nor is it proof against the action of acids or extremely hard wear. Where acid-containing substances, such as olive brine, kraut brine, pickle brine, vinegar, and most fruit and vegetable juices, come in contact with the floor, or where heavy trucking is done over the same spot continuously, it is important that the concrete be protected by some resistant material. Our practice usually has been to use industrial plank or mastic flooring as this protective surface.

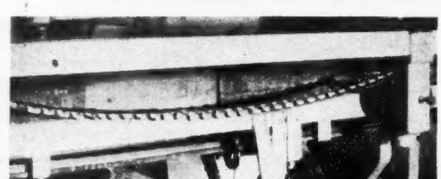
Old cement floors that are acid-eaten or badly worn in spots can also be repaired by these materials, provided the strength of the floor itself has not been impaired.

If it is at all possible to plan the placing of equipment before laying the floor, it is highly desirable to provide individual drains for each item of equipment; but if it cannot be done beforehand, then the floor should be divided into squares or bays of from 14 to 20 ft. each way with a drain in the center of each bay. Sometimes where the line-up is favorable, an open gutter is a desirable form of drainage, because the slope is all one way instead of four ways and because it will take care of a large volume of water without backing up.

The finest looking floor for wet manufacturing is the tile or packing-house brick floor, if it is properly laid. And if it can be kept in its original beauty,

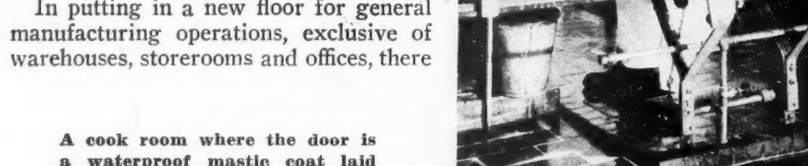


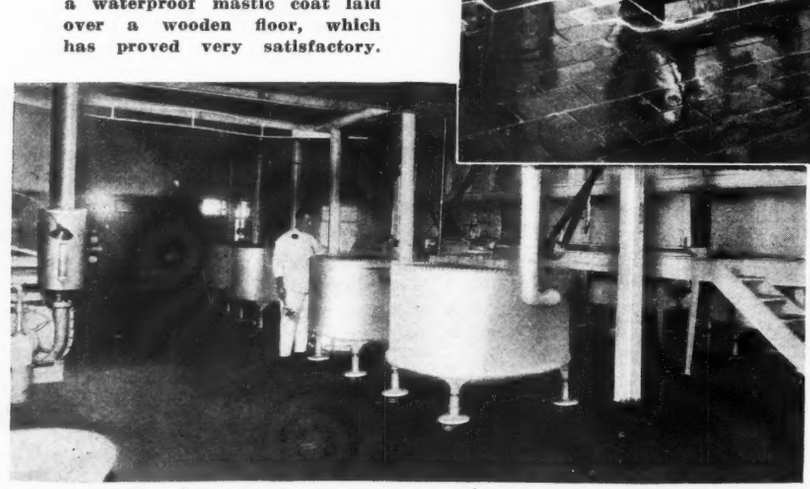
How a good concrete floor can be ruined by acids and brines.

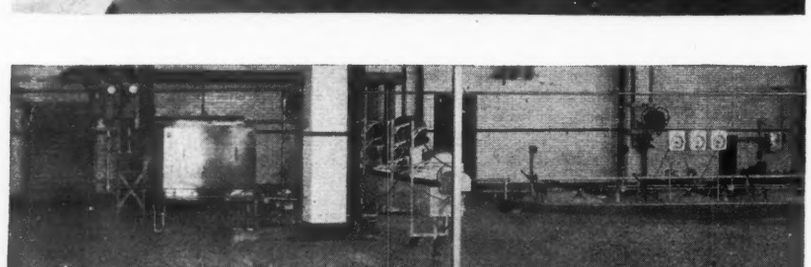


Good tile floors, properly laid, are good where beauty and waterproofness are desired.

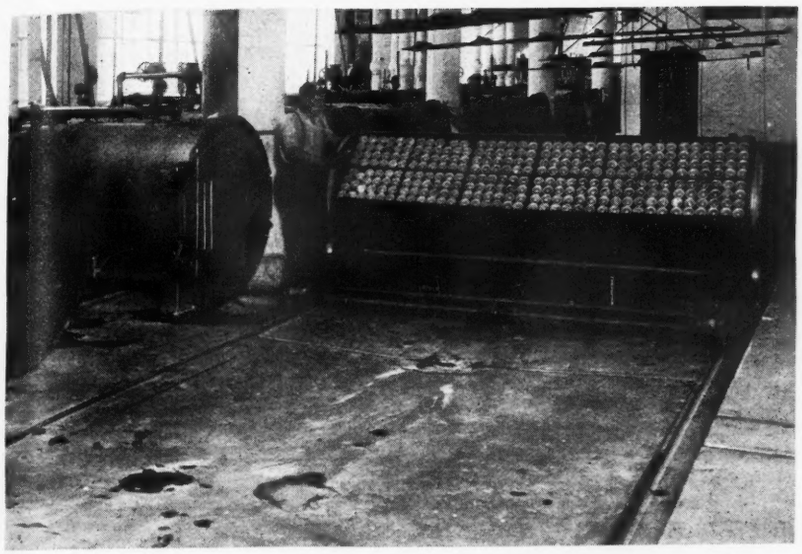
A cook room where the door is a waterproof mastic coat laid over a wooden floor, which has proved very satisfactory.







Terrazzo makes a beautiful floor, but it is dangerously slick, when wet or oily, particularly for those wearing rubber heels.

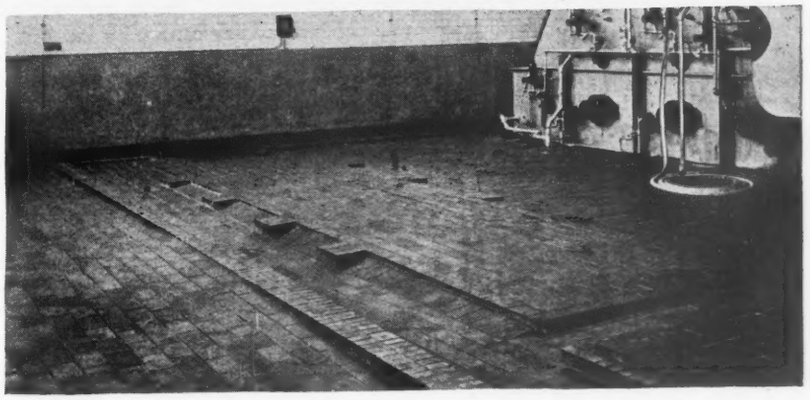


A very good reinforced concrete floor subject only to water and foot wear. Yet note the bad spots that have developed.

Top, Right—A reinforced concrete platform. Note the streaks where acids have eaten into the concrete. The destructive action of pickle brine plus wear from trucks continued until the reinforcing steel was bared in spots. It has since been repaired and covered with industrial plank.

Center, Right—A tile floor improperly laid—joints too wide; not flat; insufficient drainage.

Bottom, Right—Whenever possible it is desirable to provide individual drains for each item of equipment. This floor is in a dairy.



it is ideal. Our experience with brick and tile is limited to our meat-packing department, where they have been in use for many years. Where tile is employed, it must be used with the understanding of the proper way to use tile as well as the advantages of its use. In locations involving extensive wear, as in doorways or corners where trucks always follow the same course, or at elevator landings or loading docks, the tile is best replaced by some other material such as a roughened steel or cast-iron plate.

Tile itself when properly made of the right material is impervious to water, acid and organic matter. The bonding material or cement, however, is not free from attack by these substances, and hence the tiles in a floor should be laid as close together as possible. To lay a tile floor with wide joints for wet manufacturing is to invite trouble, and an ordinary workman usually is incapable of laying it close enough to do a perfect job. For this kind of work it usually is best to employ a tiling contractor, whose men are trained in the painstaking job of close setting.

Tile-surface floors require a perfect sub-floor, waterproof and structurally strong, for tile will not bend like mastic or plank and, like concrete, it will crack if the floor sags. Concrete presents a hard, smooth surface that is not waterproof unless it is treated, which is not always a satisfactory solution of the problem. Furthermore, concrete will dust away where the wear is severe.

New Method Of Using Corn Sugar

IT IS now practicable to make use of corn sugar for sweetening condensed skim milk. Yesterday, anybody who attempted to put corn sugar in condensed milk got an unmarketable product for his pains. Today, corn sugar may be used with results not perceptibly different from those obtained with cane sugar.

The fact that corn sugar and condensed milk can now be used together is likely to prove of capital importance to the manufacturers of sweetened condensed skim milk for two reasons: (1) corn sugar is cheap; (2) it is now legal to use it in food products in place of cane sugar without declaring its presence on the label.

So far as the condensed milk manufacturers are concerned, the only thing that kept the bars up after the corn sugar decision of the Department of Agriculture in 1930 was the difficulty of the chemical problem involved in making such a substitution. It was found that several things happened to condensed skim milk when it was sweetened with corn sugar. For one thing, from the time the sugar was added to the milk in processing the milk developed a dark brown color, which increased if the milk was stored at high temperatures. For another, when the milk was stored at high temperatures, it underwent a progressive physical thickening which was highly objectionable. Milk so thickened had every appearance of having been spoiled by bacterial action, although it had no odor of such spoilage and there were but few living organisms in it. Stored at 40 deg. F., it thickened only slightly and there was very little increase in the original discoloration; but to offset that, the condensed milk made entirely with corn sugar developed masses of dextrose crystals.

Thus the product was unmarketable for three reasons and the condensed milk producer who, for reasons of economy, wanted to substitute corn sugar for cane sugar was beset by difficulties; his product thickened and discolored at high temperatures, crystallized at low temperatures, and was more or less unmarketable at any temperature. Consequently the manufacturer gave it up and continued with sucrose.

Now R. J. Ramsey, P. H. Tracy and H. A. Ruehe, of the department of dairy husbandry of the University of Illinois, have succeeded in working out a technique which largely eliminates those disadvantages. One thing that adds to the interest of the results is that in the course of this research some curious and possibly sensational discoveries have been made about hitherto unsuspected chemical reactions which take place when corn sugar is brought into contact with proteins—such proteins, for instance, as the casein and albumin of milk. These reactions, indeed, were making the trouble. They had first to be discovered, and then a way had to be found to prevent them. What has been learned from these studies may prove of first rate importance to other branches of the food industry that have use for corn sugar as an alternative for cane sugar in the processing of protein-bearing products.

The progressive thickening of dextrose-sweetened condensed milk in storage at high temperatures was found to be due to the effect of corn sugar on the stability of casein and albumin, especially the former. There is a direct reaction between the protein and the dextrose which had not formerly been suspected. Its exact nature will have to be determined by further research.

Closely allied to the reaction which causes this thickening is the one that causes the brown discoloration. The application of too much heat, in processing and in storage, is the active cause of the trouble in each case. The discoloration may take place when the hot milk and the hot syrup are combined in manufacture, and it becomes progressively stronger if the milk be stored at high temperatures.

At first the discoloration was thought to be the result of caramelization, caused by excessive heat. It looked like caramel, and it tasted like caramel; but it was found to be due not to the direct action of heat but to a direct chemical reaction between the corn sugar and the amino acids of the casein and albumin of the milk—especially of the casein, which was also the more active of the two proteins in the thickening of the milk. The resulting colored substance was a protein-sugar compound. It would thus seem that a distinction should be made between this protein-sugar condensation reaction and true caramelization.

The experiments for finding out the nature and cause of the discoloration of the milk were based on the fact that the apparent caramelization was pronounced in the case of corn sugar, and was either absent in the case of sucrose or very slightly in evidence. Tests were therefore made to determine the relative sensitivity of corn sugar, cane sugar, and milk sugar to caramelization. None of these sugars showed any sign of caramelization when they were heated to as high as 250 deg. F. for 30 minutes—which is in excess of the temperature used in ordinary processing. It also was found that pure white albumin and casein retained their whiteness intact when heated in a distilled-water solution. Mere heat at the usual processing temperatures, therefore, was ruled out as a possible cause of the darkening; and hence the discoloration was not caramelization.

But when milk, albumin, or casein were mixed with milk sugar or corn sugar, and then heated, the brown discoloration appeared. Further tests showed that no constituent of the milk caused this darkening except the proteins. Always it happened that the addition of a small quantity of albumin or casein to solutions of dextrose or lactose caused discoloration at 240 deg. F. On the other hand, sucrose failed to show any changes in the presence of proteins. It was therefore evident that what turned the trick was the reaction of the dextrose on the amino acids of the casein and the albumin.

It was found also that the rate of color development depends on the kind of sugar used and on the method of processing. Corn sugar, corn syrup, invert syrup, fruit sugar, and milk sugar all develop brown color when heated with a small quantity of protein. Cane and beet sugar, on the other hand, show no discoloration. But it sometimes happens that under practical conditions sucrose may be partially inverted, and that it will then likely cause sweetened condensed milk to darken during storage.

One fact that comes emphatically to the front in these tests is that heat has a very pronounced effect in producing the brown color. For this reason the question of the temperature used for forewarming the milk in processing, and the temperature used in storage, are of great importance in the technique of sweetening condensed milk with corn sugar.

In storage, the rate of darkening increases very rapidly as the temperature is increased. For example: At 200 deg. F., dextrose-sweetened condensed milk becomes dark brown in an hour; at 100 deg. F., a similar color develops in 3 months; but if the milk be stored at temperatures ranging from 40 to 50 deg. F., there is but slight darkening.

The brown color also has a strong

tendency to develop while the milk is being processed, because the condensation reaction is very rapid at high temperatures. Dextrose-sweetened condensed milk forewarmed, for instance, at 200 deg. F. will be somewhat brown on drawing from the pan. But by reducing the forewarming temperature to 150 deg. F., the color of the finished product can be made to approach closely the color of sucrose-sweetened products. However, that does not prevent the dextrose-sweetened milk from undergoing physical thickening and discoloration at high storage temperatures.

This double problem of avoiding discoloration and of avoiding the physical thickening is met by the technique which was developed as the result of these studies. Both of these undesirable results may be largely avoided by forewarming the corn sugar and the milk separately. Since the sugar must be heated in the presence of the milk to develop a brown color, discoloration is largely prevented by adding the sugar in the form of a concentrated solution after the milk is out of the hot well.

The sugar solution may be heated to 200 deg. F. without danger of discoloration, provided there be no protein or "milk stone" in the equipment and provided the water is not alkaline. If there are any free OH ions present the water should be acidified to Bromthymol-blue. In like manner, the preheating of the milk should be managed at low temperatures, because high temperatures produce thickening, by causing the lactose in the milk to alter the stability of its proteins. The allowable temperature range is from 165 to 212 deg. F.

After the milk is drawn into the pan the sugar solution is drawn in. By this method the sugar and the milk together are exposed to a high temperature (120 to 145 deg. F.) for only a short period. If the temperatures used are too high, discoloration will result; and it will result also, regardless of the methods used in processing, if the milk be stored at high temperatures. It is worth noting, in this connection, that even sucrose-sweetened condensed milk will darken if stored at high temperatures.

The other problem that had to be met was the tendency of the dextrose-sweetened condensed milk to form masses of dextrose crystals. This tendency is due to dextrose being less soluble than sucrose; hence it is not surprising to find large masses of dextrose crystals in such a concentrated product as condensed milk. Tests showed that if the milk were sweetened with 75 per cent dextrose and 25 per cent sucrose, no crystals formed, even after 90 days' storage at 40 deg. F. But to be on the safe side it was thought best to use 50 per cent dextrose and 50 per cent sucrose. This proportion was used successfully in the preparation of several commercial batches of sweetened condensed skim milk.

Still another phase of the investigation had to do with the efficacy of corn sugar as a preserving agent. It was found that any replacement of sucrose by corn sugar in the manufacture of condensed milk should be on a pound for pound basis.

The tests show that the preserving power of the two forms of sugar is about the same. Their relative preserving power, however, does vary slightly with the concentration and in the effect of the two sugars on different types of bacterial organisms. At low concentrations (20 to 30 per cent) sucrose is usually somewhat more effective than corn sugar, but in the highly concentrated solutions corn sugar is somewhat the better.

To insure freedom from bacterial spoilage in sweetened condensed milk, it is necessary to have 65 per cent sugar in water. A sweetened condensed milk should then contain 28 per cent serum solids and 46.8 per cent sugar. However, organisms occasionally are found that are capable of fermenting even such a product, regardless of the kind of sugar used.

Because of a difference in molecular structure, corn sugar should exert 1.9 times as much osmotic pressure as sucrose. However, actual tests have shown that in concentrated solutions sucrose exhibits almost as much osmotic pressure as dextrose[1]. Berkley[1] has shown that in dilute solutions it takes 1.6 lb. of sucrose to exert the same osmotic pressure that 1 lb. of dextrose will exert. In concentrated solutions, such as are found in sweetened condensed skim milk, it takes only 1.2 lb. of sucrose to equal 1 lb. of dextrose in osmotic pressure. This unexpected increase in the efficiency of sucrose is explained[2] by the relative affinity of the two sugars for water. Sucrose has an affinity for water about 2.5 times that of dextrose. This hydration of the sugars in solution increases the actual concentration of sugar in free water, thus causing them to exert abnormally high osmotic pressure.

However, the bacteriological examinations made during this study indicate that the preserving power cannot be explained entirely on the basis of osmotic pressure. In dilute solutions sucrose is more efficient than dextrose, but in concentrated solutions dextrose is slightly more efficient than sucrose. Such behavior is evidently due to the relative availability of the two sugars for bacterial growth. This differs markedly; and numerous tests have shown large variations in preserving power when the osmotic pressures were apparently the same.

The importance of these findings, and of the suggested procedure, at the end of this article, for using corn sugar in the manufacture of sweetened condensed skim milk, is based on the cheapness of corn sugar, on the extensive uses to which it is already being put, and on certain nutritive advantages which cause it to be rather widely used by the medical profession. The fact that it is only 65 per cent as sweet as sucrose may, for certain purposes, be an added advantage.

What gives the whole question of utilizing corn sugar in new ways an added impetus at this time is the announcement of the Secretary of Agriculture, under date of Dec. 26, 1930, that "the use of corn sugar as an ingredient in the packing, preparation, or processing of any article of food in which sugar is a recognized element need not be declared on the label of any such product."

Sweetened condensed skim milk is used extensively by commercial bakers, and, to some extent, by ice-cream manufacturers. Inasmuch as corn sugar also is used by both industries, it would seem that there could be little objection to the presence of this sugar in the condensed milk itself. Inasmuch as the sugar added to the condensed milk represents nearly two-thirds of the ingredient cost, the use of corn sugar in the manufacture of sweetened condensed milk would result in appreciable saving to the industry.

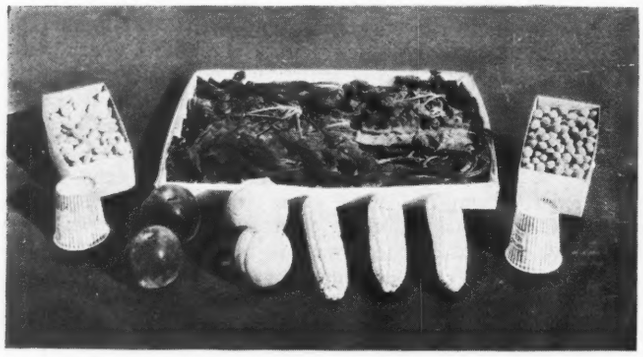
The following procedure is suggested for the manufacture of dextrose-sweetened condensed skim milk:

1. Preheat milk to 165-212 deg. F. High temperatures will improve the body of the finished product but will encourage progressive thickening and browning.
2. After all of the milk has been drawn into the pan and condensed to approximately the desired concentration, add sugar in form of syrup. Prepare syrup as follows:
   (a) From the ratio of solids in the desired product and the pounds of milk solids in the skim milk, calculate the quantity of sugar needed. For example, if a product containing 28 per cent milk solids and 42 per cent sugar is to be made and 5,000 lb. of skim milk containing 9 per cent serum solids is available, the quantity of sugar needed will be
   $$\frac{5000 \times 0.09}{28} \times 42 = 675 \text{ lb.}$$
   (b) Weigh out the calculated quantity of sugar, half as cane or beet sugar and half as corn sugar.
   (c) Dissolve in enough water to make a concentrated solution (60 per cent) and heat to 175 deg. F.
   (d) Be sure heating is done in absence of milk remnants or "milk stone."
   (e) Water used for preparing syrup should be free from OH ions. If alkaline, reduce to neutrality by the addition of a weak acid such as acetic.
3. Condense until the desired concentration has been reached. For a product containing 28 per cent serum solids, 21 per cent sucrose, and 21 per cent corn sugar (by weight) the Beaumé reading at 120 deg. F. is 34.2 deg.
4. Draw from the vacuum pan and cool as follows:
   (a) Cool rapidly to 93 deg. F.
   (b) Add 4-5 oz. of milk sugar to each 1,000 lb. of condensed milk and mix thoroughly.
   (c) Cool to 75 deg. F. in 45-60 minutes, agitating constantly.
   (d) Cool to storage temperature.
5. Store at as low a temperature as practical.

REFERENCES

1. Berkley, Earl of, and Hartley, E. J.: *Trans. Roy. Soc. London*, 206, 1906.

2. Hunziker, O. F.: "Condensed Milk and Milk Powder." Published by author, La Grange, Ill., 1926. Fourth Edition.



Samples of fruits and vegetables that have been preserved by the "Z" process

Cartons of different kinds of meat that have been quick-frozen in a fog of brine

Brine Fog Quick-Freezes Without Extreme Temperature

By HIRAM MERRIMAN
New York, N. Y.

ALTHOUGH the "Z" process of quick-freezing foods has been used commercially for the past two years in England, France, Italy and Norway, it is more or less new in this country. And, like most scientific innovations, the details of its characteristics, applications and advantages are relatively unknown—a foggy mystery, to speak facetiously.

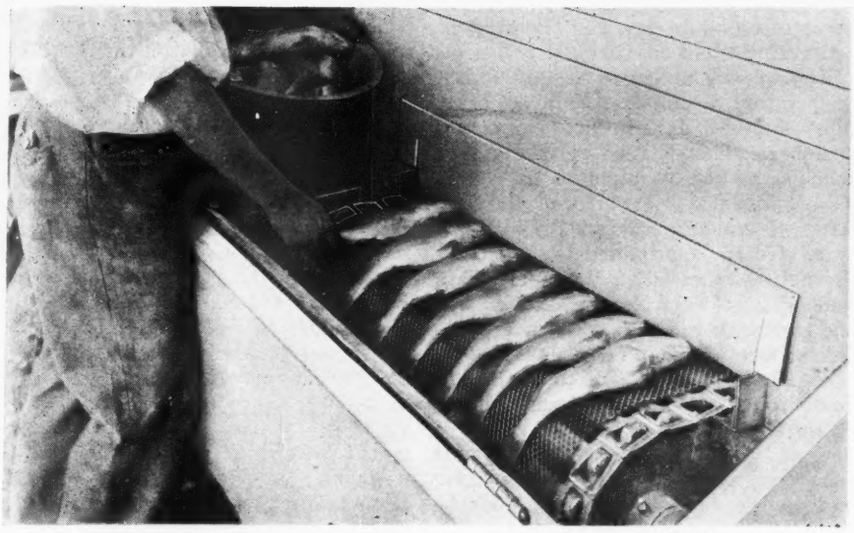
In developing the process, M. Zarotschenzeff considered three factors: medium, velocity and temperature. When he began his experiments, air-chilled rooms were almost universally used for freezing meat and fish. But the heat conductivity coefficient of air is low, being only 0.0000568 at 0 deg. C., whereas the coefficient for water at its greatest density, 4.1 deg. C., is 0.00143, which means that it is about 25 times as efficient as air. So M. Zarotschenzeff discarded air and decided upon some kind of water combination. This narrowed to a brine. He tried all kinds, sea-water brine, calcium-chloride brine, brine with alcohol added, brine with sugar added, and so on. And he came to the conclusion that for a practical method, pure water and common salt (sodium chloride) offered the greatest opportunities. Alcohol is expensive and generally cannot be used because of its injurious effect on food products. With calcium-chloride brine, temperatures down to —70 deg. F. can be obtained, but this salt is expensive and cannot be used in direct contact with the food product, as its taste is objectionable. Pure salt is cheap, and slight traces are not objected to by the consumer. Solid CO_2 is a possible refrigerant, since it produces extremely low temperatures, but it is costly and there is danger of "burning" the product, though it is well adapted for holding low temperatures.

With the medium selected, the velocity of that medium presented the next problem. Dunkerley, in a series of tests in freezing products immersed in brine, found that it took 50 to 60 per cent longer to freeze in still brine than in brine moving 3 ft. a second. From this, it was evident that the quick-freezing problem would be solved if the brine could be moved past the product at rapid rates. Unfortunately, such a method is too costly to be practicable. The next logical step, therefore, and the crux of the "Z" method, is atomization of the brine. The liquid, coursing through pipes under pressure, is released through numerous extremely minute orifices in the sides and top of the freezing chamber. It is dispersed at a tremendous velocity, producing a fog of fine particles that bathes the product and absorbs the heat.

The lowest temperature attainable with a saturated solution of salt brine is —6 deg. F., the freezing point of the solution. But with the velocity attained by atomization, this moderate temperature will suffice for rapid and satisfactory freezing. And by working at such a moderate temperature, considerable expense is eliminated. Lower temperatures mean money, and if the freezing medium is lowered to —20 deg. F. or more, double-stage compression must be employed.

The "Z" process is simple and flexible. The atomized brine, as it collects, trickles by gravity into the bottom of the chamber, whence it flows through filters, is chilled and is ready for another circuit. In contrast to the immersion method, where, as in the freezing of fish, the brine penetrates every crevice and leaves an undesirable residue, the wet-fog process leaves only a thin layer of moisture on the outside. This is easily washed off during the glazing process. The "Z" process is flexible because it is not limited to any particular arrangement. Existing cold-rooms, long tunnels or vertical tunnels can be used, and it is easily adapted to a conveyor.

In addition to the obviation of low temperatures, certain other features of the process tend to economy. Only



Placing hard-heads on the conveyor belt of an experimental continuous "Z" process freezer

one-fifth as much brine is necessary as in the immersion method; this means less volume to move, with a saving in power. The freezing chamber occupies but a small space, and with the product refrigerated to the desired temperature, zero or lower in the freezer, the storage chambers need be held only at this temperature. In case of air chilling, with its lengthier processes, at least six times as much room is necessary and the temperature must be kept many degrees lower than that to which the product is to be chilled. In short, the saving on power, refrigerant, machinery and insulation can be made to pay a handsome dividend.

The practicability of the wet-fog process of quick-freezing is evidenced by the number of plants in successful operation at various points in Europe, particularly in England and Norway. And it is adapted to "floating factories" as well as to plants on land. Fog-freezing enables fish trawlers operating out of French and Italian ports to remain for weeks on the open ocean. The fish are beheaded, washed and quick-frozen on board while perfectly fresh.

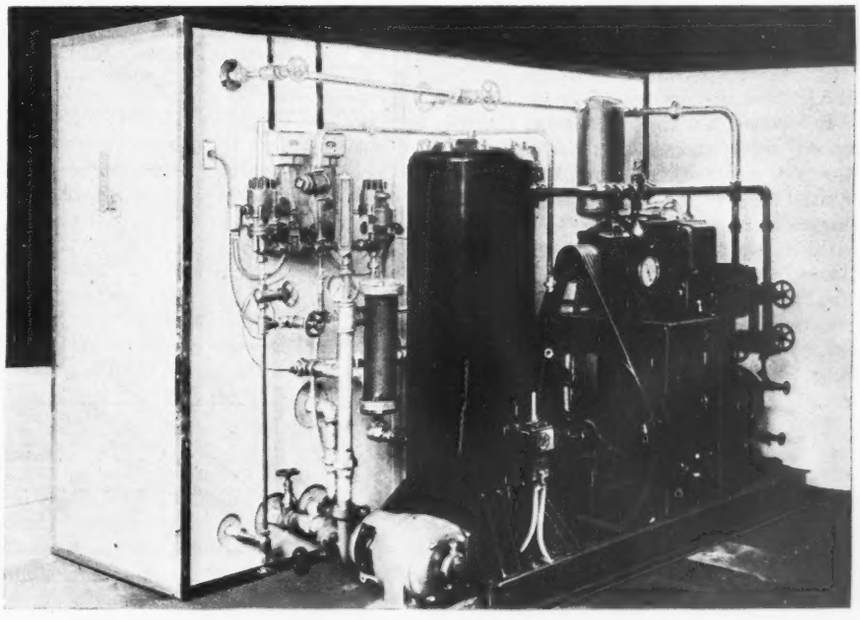
European quick-freezing companies have concentrated on fish, since there is an abundant supply. This has effected stabilization of the industry and of prices, because it enables the supply to be spread out or concentrated according to demand. Quick-freezing also facilitates easy distribution, inasmuch as latent refrigeration in the frozen product permits shipping over long distances, even where the cold-storage compartments fluctuate in temperature. Shipments are made from one of the European quick-freezing plants to Bombay, India. There the local supply is not only uncertain but it is inferior, on account of the warm climate. Consequently, the European product commands a high price.

Shrimp, oysters, crabmeat and similar sea foods are peculiarly adapted to quick-freezing. They are highly perishable and their delicate flavors can be retained only by freezing them rapidly.

In the world's great meat-exporting country, Australia, a plant using the wet-fog process has been installed. It has a promising future, for the slow-frozen Australian meat is subject to European price discounts reaching as high as 25 per cent. This is because the seepage of protein fluids causes it to be dry and deficient in flavor. Slow-frozen meat loses from 5 to 7 per cent, or more, of its weight, whereas the loss in the quick-frozen product is less than 3 per cent, and the latter retains its juices and flavor after defrosting.

One of the largest ice cream companies in England has profited by adopting the wet-fog process for hardening ice cream. With this method, the plant can freeze and harden the ice cream and have it ready for distribution by ten o'clock each morning. Thus, a fresh supply is assured daily and money is saved through abbreviated storage facilities. In England, it is desirable to produce ice cream for use the same day it is made, since the changeable climate makes it impossible to calculate the demand even one day in advance.

As part of his American enterprise, M. Zarotschenzeff has erected an experimental plant in New York City with a capacity of 4,000 lb. for each freezing period. At the least, 40,000 lb. in each 24-hour day can be quick-frozen in this unit and removed to cold-storage rooms. The freezing cabinet is 22x5x7 ft., and five doors permit quick loading.



At the left, "Z" process cabinet in which the food is quick-frozen in batches. Below, rear view of an experimental "Z" process cabinet freezer showing the refrigerating machinery

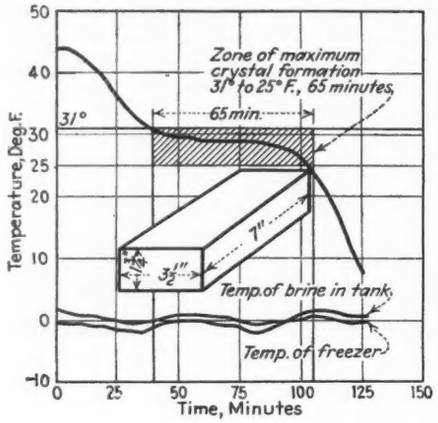


Chart showing the time required for quick-freezing fish in 7x3½x1½-in. cartons. The freezer contained 150 lb. of cartons and whole fish

The room where the cabinet is located is kept at around 35 deg. F., enabling the workmen to load and unload the cabinet without discomfort. The machinery operates without attention during the freezing process, except for a half-hourly inspection of temperature gages.

In a small tank adjoining the cabinet are calcium-chloride pipes that cool the salt brine. An improvement over the original fog-freezing process has been adopted in the experimental plant, in that the freezer shelves are composed of brine pipes, resulting in additional stability in the freezing process. A centrifugal pump operating at a 12-lb. pressure supplies sufficient pressure to force the brine through the spray nozzles at satisfactory velocity.

Extensive tests have been carried out in this plant to determine speed of freezing by the still-air, sharp-freezing method, by forced air circulation and by the wet-fog process. Whole fish were frozen in the tests, these varying in size from 7-oz. porgies 1 in. thick to 12-lb. fluke 2.5 in. thick.

Freezing in the simple air chamber was effected at a temperature of —14 deg. F. Small, flat fish up to 1.25 in. thick were frozen in 2.5 hours. With 3-lb. fish, 2 in. thick, at least 6 hours in the sharp freezer was necessary. In general, it was found that small fish required an average of 2.5 hours for freezing each inch of thickness. With larger fish, the time rose to 3 or 4 hours. Freezing with forced air circulation was found to be much more rapid. An electric fan was placed at a distance of 2 ft. from the product, with the current passing directly over the fish; temperature was —14 deg. F. The average of freezing was 1 in. during 1 hour.

The wet-fog process was used with a temperature of —3 deg. F. in the brine pipes and —2 deg. F. in the freezing chamber. The detailed results are as follows: After 30 minutes, flat fish of 1 in. thickness were frozen through. After 45 minutes, haddock 2.5 in. thick were frozen approximately half way through. At the end of 90 minutes, these haddock were completely frozen, as was the case with weakfish with an average thickness of 2 in. Five-pound bluefish 2.75 in. thick were frozen to a soft center slightly less than 0.5 in. through. At the end of two hours, all the fish were removed from the freezer and found hard-frozen. In general, the freezing rate at the experimental plant may be put at 1 in. for 30 minutes.

Half-pound cartons of fish fillets were frozen in from 20 to 30 minutes. Cartons containing 1 lb. of fish—between 1 in. and 1.5 in. thick—froze in from 40 to 60 minutes, depending upon the method of packaging and the kind of fish used.

After storage for several weeks, the fog-frozen fish were defrosted without loss in weight and were found to be fresh and juicy. When cooked they were not distinguishable from the fresh product served at the same time.

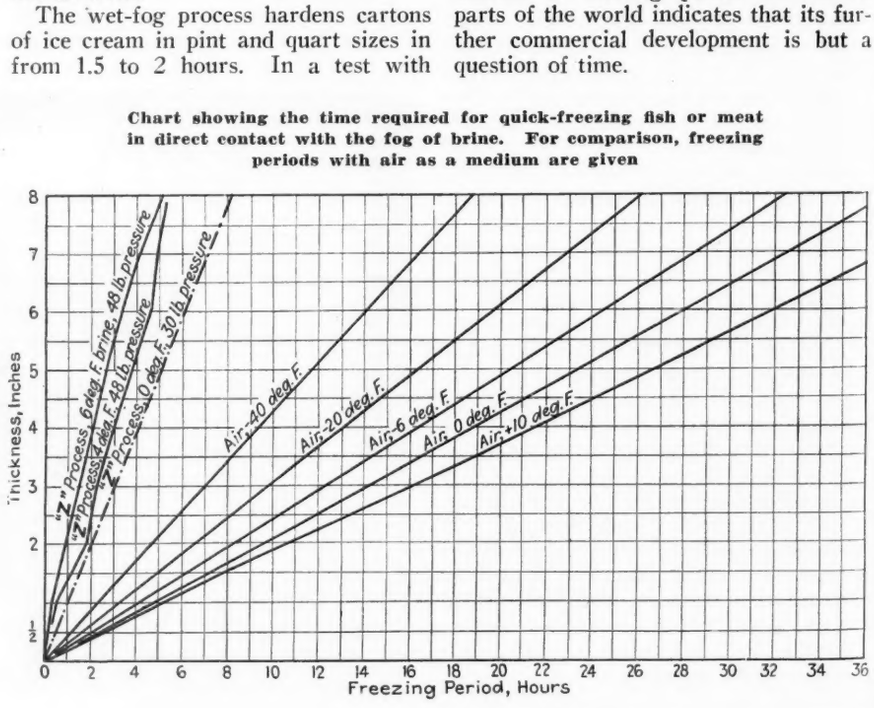
The wet-fog process has proved effective in hardening ice cream. The usual air-hardening process takes from 8 hours for small cartons to 24 hours, and longer, for 5-gal. cans. This is not satisfactory, for when the product is hardened quickly—in 4 to 5 hours—the ice crystals are minute and the ice cream is of better quality. Air-blast methods are used in some plants, but at the present stage of development most of them are costly and the results are not uniform.

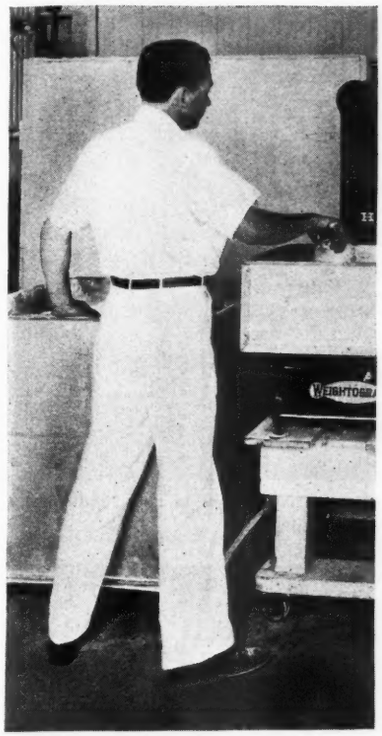
The wet-fog process hardens cartons of ice cream in pint and quart sizes in from 1.5 to 2 hours. In a test with 5-gal. cans of ice cream (diameter, 9.5 in.) fresh frozen at 27 deg. F., the following results were obtained: After 3 hours and 30 minutes, the temperature in the center of the cans was 14 deg. F.; 1 in. from the edge, it was 6 deg. F. After six hours, the ice cream was completely hardened, the temperature being 4 deg. F. in the center and 0 deg. F. near the edge. The foregoing tests were made with ordinary salt-brine fog. By using calcium-chloride brine at a temperature of —10 to —15 deg. F., the hardening could be carried out in approximately two-thirds the time and to a temperature of —5 deg. F. The consensus is that the temperature at which ice cream should be held in the hardening room is around zero. This temperature allows for a 10-deg. margin in case the ice cream is warmed through careless handling between the hardening room and the dealer's cabinet. Proper dipping temperature is generally put at 10 to 12 deg. F.

A large potential market exists for quick-frozen fruits and vegetables, and that market is now being developed. Consumption of these is on the upgrade, though many obstacles are being met both in production and distribution. When vegetables are quick-frozen their color and texture remain stable, and housewives prefer the product, when the price is not too high, because it is washed and cleaned. Fruits are still a subject of experimentation with respect to quick-freezing for the retail consumer. Methods of proper handling are being developed so that the delicate fruits will not be injured during preparation for the quick-freezing process.

The "Z" process represents another step in the long chain of progress in the science of quick-freezing. And the success of wet-fog plants in various parts of the world indicates that its further commercial development is but a question of time.

Chart showing the time required for quick-freezing fish or meat in direct contact with the fog of brine. For comparison, freezing periods with air as a medium are given


"Z" Process, 6 deg. F. brine, 48 lb. pressure
"Z" Process, 4 deg. F. 48 lb. pressure
"Z" Process, 0 deg. F., 30 lb. pressure
Air, -40 deg. F.
Air, -20 deg. F.
Air, -6 deg. F.
Air, 0 deg. F.
Air, +10 deg. F.
Thickness, Inches
Freezing Period, Hours



Uniforms make men look dignified—

WHAT EXPERIENCE TEACHES ABOUT UNIFORMS

By FRANK K. LAWLER
Editorial Department
Food Industries

—And make women more attractive.

DESIRE for sanitation, democracy among employees, cheerful atmosphere in the plant, and favorable impression upon the public has led progressive manufacturers to put their workers in uniform. And most manufacturers who have taken this step feel that the results have more than justified the expense.

However, putting employees in uniform is not as simple as it may seem, at least not for the manufacturer forced to dodge any increase in expenses. Many problems are involved, and for that reason some plants find their methods unsatisfactory either to the management or to labor.

It may as well be stated at the outset that no blanket rules can be laid down. Conditions vary too much. Nevertheless, certain fundamental principles are involved, unbiased consideration of which is essential to a correct approach to the problem. By considering those principles in lieu of operating methods uncovered by FOOD INDUSTRIES in a survey of 33 food plants, plant managers can arrive at some conclusion as to how they should purchase, launder, repair and replace uniforms.

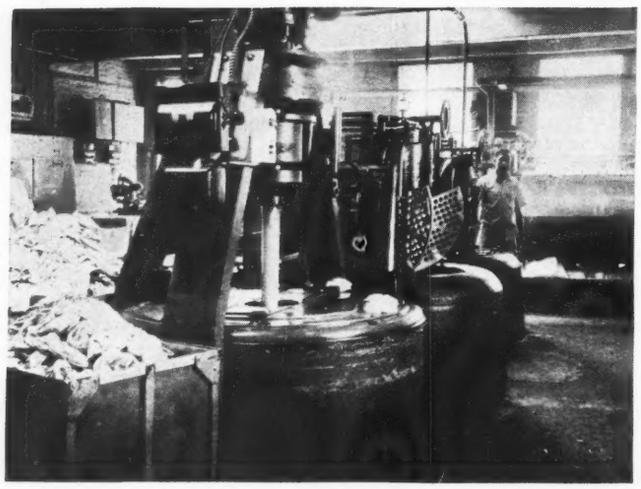
There are two extreme ways to finance uniforms: one is to make the employees furnish, launder and repair the garments; the other is for the company to carry the entire burden. The former obviously is unfair, unless the wage scale justifies it. And, more often than not, it results in dissatisfied labor and defeats one of its main purposes. The latter, perhaps, draws too heavily upon the factory budget. Between these extremes lie several more or less happy compromises, any one of which may be found in some plant or other.

Getting down to cases, the New York division of the National Biscuit Co. supplies, launders and repairs uniforms for all of its 5,000 employees. The cost of doing this, the company feels, is justified by ensuing advantages, of which sanitation in manufacturing operations and a feeling of equality among the workers are paramount. Taking another example, Eatmor Chocolate Co., Pittsburgh, Pa., buys aprons and caps at wholesale and sells them to the girls at cost, the employees keeping the uniforms clean and in good condition. The company has the girls bear this expense because most of them live at home and would rather have their aprons and caps as personal property and take care of them as such.

To plant managers in doubt as to the advisability of authorizing expenditure for uniforms, this statement from the California Walnut Growers' Association should be of interest: "Our reasons for supplying employees with clean uniforms are virtually the same as those of any plant that strives to prepare any food product under orderly, sanitary conditions. We believe the advantages of providing clean uniforms for employees, without cost to them, amply repay us for the nominal average cost of $2.52 per employee per year." Incidentally, this figure for cost is low because of a six months' operating season and the fact that the company does its laundry work very economically.

After determining how unitorms are to be bought and who is to pay for them, the company naturally has to get some concept of what type of garments it wants. Here it should be kept in mind that simplicity, washability, appearance and durability are the prerequisites of satisfactory uniforms. Those with few or no buttons are to be preferred, since maintenance is lower for them. Where colored uniforms are desired—and these show dirt less readily—fast colors that harmonize with the color scheme of the plant should be obtained. As to durability, it is generally conceded that duck is the sturdiest and is the ideal fabric for heavy duty. For women's uniforms, however, Indianhead and muslin have the advantage of better appearance. Whatever the material, uniforms should be well fitted and should be laundered frequently to insure fresh appearance. And caps to match the uniforms keep the hair looking tidy.

The Foulds Milling Co., Libertyville, Ill., manufacturer of macaroni products, has achieved a degree of class in the uniforms for its women employees. These garments are white with green trimming and have large pearl buttons down the front. This dress is sufficiently attractive to be worn back and forth to work. However, the cost is $2.30 per uniform, and the material is a little heavy for hot summer use. But steps are being taken to obviate these objections. The company is asking a local merchant to stock a standard cloth which may be sold at about 20 cents a yard, and it is considering the use of



Extractors in the plant laundry of National Biscuit Co.

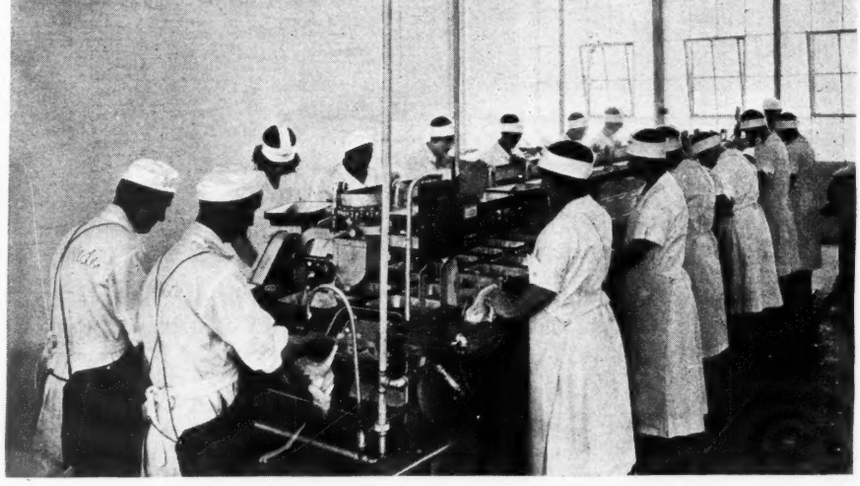
Four types of uniforms are shown in this food-plant picture.

light-weight cloth during the summer.

The experiences of this company are enlightening. Before it adopted the green uniform it used a yellow checked material, the girls being allowed to buy this and make their uniforms as they saw fit. In theory this was fine, since it permitted each girl to adapt her uniform to her figure and wear her most becoming style. But in practice, the plant manager found his employees wearing everything from a yellow dress with red trimming to the plain "Mother Hubbard" style. As a result of this experience, the company is standardizing the new green uniform by putting in a line of patterns for the girls. And, besides, all uniforms must pass inspection by the welfare supervisor.

The first cost of uniforms is not as great as one might imagine. Anyone desiring exact prices will, of course, make inquiry at a supply house, but an approximation may be obtained from what other companies are paying. One company quotes these figures: wrappers for girls, 61.3 cents; unbleached drill shirts, 41 cents; unbleached duck pants, 52 cents; foremen's white duck coat, 65 cents; foremen's white duck pants, 67 cents. A second concern gives the following list which was in effect in 1931: women's aprons, 75 cents; women's caps, 20 cents; khaki shirts, 70 cents; white shirts, 65 cents; khaki trousers, $1.15; white trousers, 85 cents; caps, 7 cents. A third company buys blue chambray gowns in lots of six dozen at 55 cents each. White flat-folded caps cost the company about 12 cents each.

As to how often this first cost must be repeated, the first company considered above finds that two uniforms last an employee a year. In the second company, the women employees in one year bought about 1.25 uniforms and 2.0 caps per capita; the men, about 1.25 shirts and 1.50 pairs of trousers. The third company reports that its uniforms last for 26 washings.



Sanitation, impressive appearance, and a feeling of equality characterize this production group.

The greatest problem facing the company with employees in uniform is whether to have the garments laundered by a commercial laundry or install equipment in the plant for doing it. There is conflicting evidence on this point, and it seems that the more economical procedure will be determined, in the final analysis, by outside prices. It is of interest to observe that a certain large and progressive candy plant employing 2,200 men and women hires its laundry service. But another large concern operating several associated dairy and ice cream plants does its own laundry. Both companies are in large cities where competition between commercial laundries keeps prices down. A certain small plant employing some 300 men and women has found that it can launder its uniforms at "about half" what it would cost if the work were done outside. This seemingly disproves the contention that small plants cannot do their own laundering economically.

From these facts it is obvious that each plant should investigate costs for both the plant and the outside laundry. However, a conception of the cost of cleaning uniforms with plant equipment may be obtained from practical examples. In the modern and complete plant laundry of the New York division of the National Biscuit Co., it costs 85 cents per employee per month for laundry, repair and delivery to the dressing rooms. This covers, on the average, two uniforms per employee per week, giving a low figure for cleaning one garment.

California Walnut Growers' Association gives an interesting breakdown of plant-laundry costs. It finds the charges for cleaning a single garment to be 0.655 cent for soap, starch, bleach, water softener and rust preventives; 0.248 cent for water, gas, grease and repairs; 1.982 cents for labor (four women full time); and 0.770 cent for machinery depreciation. The total for these items is 3.655 cents. Full-length, blue denim uniforms soiled with walnut

stain comprise the bulk of the wash for which these costs were determined.

To present the commercial-plant angle of the laundry-cost picture, a letter from Life Savers, Inc., Port Chester, N. Y., may be quoted: "We have found it economical and very practical to have our uniforms furnished and laundered by an outside laundry. Our female employees are given a clean cap and apron each week. One year covers 50 weeks and the cost per employee for that period is $9.25, including replacement, laundering and mending. The employee leaves 12.5 cents a week, or $6.25 a year, making our cost per employee $3.00 a year, which is only 6 cents a week." Another company, Quaker Maid Co., Inc., Brockport, N. Y., finds its plant is not of sufficient size to have a laundry and quotes these figures on having the work done outside: men's uniforms, 30 cents each, including coat and pants; ladies' uniforms, 11 cents each.

Since the National Biscuit Co., New York division, has a completely equipped plant laundry, a description of the machinery in the plant will indicate what the larger laundries involve. In the washing room are five washers of the following sizes: two, 42x84 in.; one, 42x108 in.; one, 36x42 in.; and one, 42x72 in. In this room are also two 36-in. extractors and one 48-in. extractor. Two drying tumblers, both 42x90 in., and a starch cooker complete the washing-room equipment.

In the pressing room, where the starched and more intricate goods are ironed, there are five 52x15-in. steam presses, five 50x20x10-in. steam presses, and six cap presses. In another room, where unstarched goods are ironed, there is an eight-roll chest ironer and a six-roll cylinder flat ironer. The former handles uniforms, these garments having rubber buttons, and the latter irons flat goods.

In still another room are six power sewing machines, one button machine and one embroidery machine on which girls repair uniforms, alter new ones and make the caps for the employees. Two marking machines that identify the uniforms of each employee complete the list of equipment. Eleven men and 30 girls work in this plant laundry. This is a sizable laundry, but it handles, in addition to uniforms, a volume of towels and covers equal to that of the uniforms. Not only that, but it takes care of laundry for four of the company's plants outside of New York City. The volume of this work amounts to about 50 per cent of that of the New York plant.

To summarize the method in which food plants are meeting the problem of uniforms, the survey made by FOOD INDUSTRIES showed that 13,113 of the 16,510 workers in the plants covered were in uniform (this refers to uniforms of the washable type). Nine companies, with 8,191 uniformed workers, paid for the uniforms. Seven others, with 2,598, sold the uniforms to the workers at the wholesale price. Five companies, with 756 workers, asked the employees to supply the uniforms.

Eight companies follow the practice of having a uniform supply company furnish the uniforms to the workers at regular intervals. Four of these concerns, with 756 uniformed employees, bore the expense themselves. Two, employing 285, split the expense with the employees, while the other two, with 265, placed the entire burden on the workers.

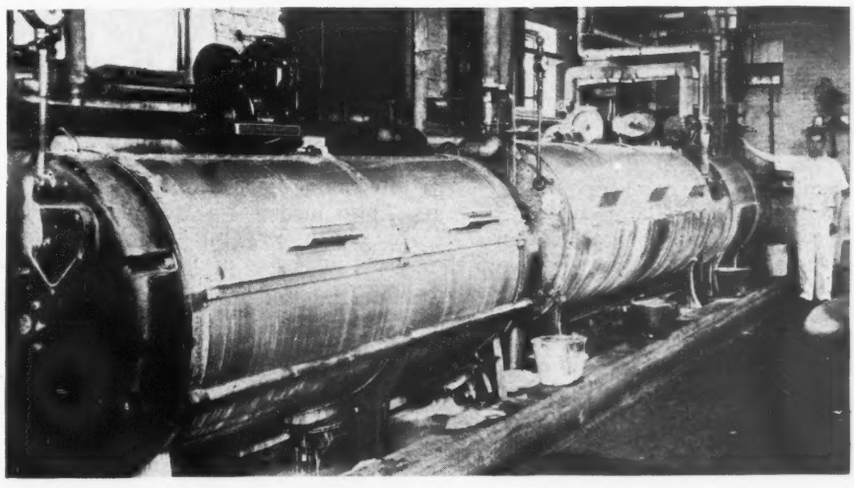
The frequency with which the uniforms were changed was reported as follows: nine companies, daily; sixteen, twice a week; one, three times a week; and three, weekly. In many of these plants, of course, the frequency varies with the type of work.

In regard to the manner of doing the laundry, eight companies, with 6,275 uniformed workers, operate their own laundries; nine, with 4,625, pay for laundering by local concerns; and seven, with 901, ask the employees to either pay for laundering or do it themselves.

A wide variation was found in the life which different companies were getting from their uniforms. Four plants were obtaining three months' life; one plant, three to six months; six plants, six months; four plants, seven to twelve months; three, over one year. It is a fair estimate to say that under average conditions the average uniform lasts 26 washings.

Because of the other factors entering into the life of uniforms—quality of material, frequency of washing, and type of work—it is impossible to draw any accurate conclusions from the survey as to whether longer life is obtained when the laundering is done in or outside the plant. However, it is accepted as a fact that garments last longer when the dirt and stains are removed by a specially prescribed treatment.

The value of uniforms in food manufacturing plants is well established—witness their relatively low cost and manifold advantages as manifest in practice. Their acceptance is widening and the trend is toward dressy styles with the garments cut to fit the figure. In other words, the production force is taking on an atmosphere of dignity that spells pride in the job and better efficiency in the company.



Above, women pressing starched uniforms in the National Biscuit Co. laundry. Below, three washers in the same plant.

How to Get Better Quality In Frozen Peaches

A Study of Varietal and Physiological Factors Influencing the Preservation of Peaches in Small Containers by the Frozen-Pack Method

By JOSEPH S. CALDWELL
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Bureau of Plant Industry
U. S. Department of Agriculture

RAPID extension of freezing preservation to a wide variety of fruits and vegetables has resulted in a number of efforts to apply such methods to peaches. The earlier attempts to freeze in barrels by methods similar to those employed in the frozen-pack barreling of berries[3, 6, 14] did not yield wholly satisfactory results and very small quantities of peaches are so packed at the present time. Very satisfactory crushed peach products—so-called pulps—for use in ice creams and sherbets are produced by methods developed by Turnbow and Cruess[13] and Culpepper, Caldwell and Wright,[2] 5-gal. friction seal cans or No. 10 sanitary cans being employed as containers. More recently, interest has centered upon attempts to produce an acceptable sliced, ready-to-serve fruit in small consumer packages. A review of the published reports of experimental work[1, 5, 7, 8, 9, 15, 16] indicates that a number of difficulties have been encountered and that wholly satisfactory methods of preserving the appearance and flavor of peaches by freezing methods have not yet been developed.

One problem of considerable importance to which comparatively little attention has thus far been given in freezing studies with peaches is that of the adaptability of different varieties to the purpose. It would seem to be highly probable that different varieties of peaches would behave under freezing treatment just as groups of varieties of any fruit or vegetable are known to do under canning processes, some yielding excellent products while others are mediocre or poor.

Purpose of Work—The work here reported was undertaken primarily to obtain information in regard to dessert quality and appearance of the frozen ready-to-serve products obtained from a considerable number of varieties of peaches. The secondary purpose in the work was to obtain information as to the effects of stage of maturity of fruit, type of container, concentration of syrup, rate of freezing, method and rate of defrosting, and time elapsing between defrosting and consumption upon appearance and quality of the product.

Material and Methods—The material employed was obtained from the peach variety collection of the U. S. Department of Agriculture at Arlington Farm, Va., just outside the District of Columbia, or from near-by orchards. The fruit was picked by the experimenters themselves, taken directly to the laboratory, and packed within a few hours after harvesting. The general method of preparation was one of sorting for uniform ripeness, peeling by immersion for 1½ to 2 minutes in 10 per cent lye solution at 140 deg. F., washing in running water, and placing in ice water. Stoning and slicing were done by hand, the fruit being held in ice water until actually packed in the containers. This treatment effectively prevented any discoloration of the fruit prior to packing.

Two types of container, plain tin No. 2 sanitary cans and a low form of paraffined paper cup of slightly smaller capacity, were employed in order to permit comparison of fruit frozen in hermetically sealed containers with identical lots of material in containers permitting access of air. The containers were filled to $\frac{3}{16}$-$\frac{1}{4}$ in. of the top, the cans receiving 12 oz. of sliced fruit and 8 fluid ounces of syrup, the paper cups 10 or 11 oz. of fruit and 5½ fluid ounces of syrup, and were closed immediately after filling.

Two methods of freezing, one slow, the other very rapid, were employed, using material in both types of containers. Slow freezing was secured by placing the containers in a freezing room held at 16-18 deg. F.; rapid freezing was accomplished by placing the containers in a box, covering them with coarsely crushed solid carbon dioxide, and allowing them to stand overnight. The material frozen at 16-18 deg. F. required 6 to 8 hours to reach a temperature of 27 deg. F. at the center; that frozen with solid carbon dioxide reached a like temperature in 1 to 1½ hours but reached minimum temperatures of —80 deg. to —82 deg. F. after 8 or 9 hours.

All the material, as soon as frozen, was stored in a room kept at 16-18 deg. F. and held undisturbed for approximately six months before being removed for examination.

Examination of the material was carried out with two purposes in view. The first of these was a detailed, systematic comparison of variety with variety as regards appearance and quality. The points considered in these varietal comparisons included, in the frozen material, the character of the ice mass and the odor and color of the fruit; in the defrosted material, the odor, color, texture and flavor of the fruit, the quantity, density (degrees Brix) and color of syrup at opening, and the degree and rate of change in color, texture and flavor of fruit during 24 hours' exposure in air. The second purpose was to obtain information in regard to the effects upon the quality and appearance of the material as a whole of the different types of treatment employed. The results of this portion of the study are of considerable importance because of the very marked effects upon the product of stage of maturity, concentration of syrup, type of container, and rate of freezing, which were apparent in all the material irrespective of variety, and will be stated in summary before presenting the results of the varietal comparisons.

Effect of Stage of Maturity—Fruit of several varieties was packed at three

or more stages of ripeness, beginning two or three days before the fruit had reached eating ripeness and ending with the ripest fruit which could be prepared for packing. In all varieties, discoloration of the fruit, both during preparation for freezing and during and after defrosting, was most rapid and pronounced in the least mature fruit and decreased in rate and intensity with advancing ripeness. The underripe fruit was firm and tough, with little distinctive flavor. Flavor improved steadily up to soft ripeness, but soft ripe fruit collapsed badly on thawing. The best stage for freezing purposes is reached about one day before full eating ripeness, at which stage the fruit has developed a considerable degree of characteristic varietal flavor but is still firm enough to retain its form on thawing.

Effect of Concentration of Syrup—Material for the varietal comparisons was packed in 50 per cent syrup, but smaller quantities of most of the varieties were packed in 30 per cent and 70 per cent syrup, in dry sugar (1 part to 3 parts of fruit) and without addition of any sweetening agent. The material in 50 per cent syrup was in all cases considered best. That in 70 per cent syrup was somewhat shrunken in appearance and was too sweet; that in 30 per cent syrup was flat, characterless, not sufficiently sweet, and considerably discolored. That in dry sugar was badly discolored and shrunken, tough in texture, and rather disagreeable in flavor in consequence of extensive oxidation. The fruit packed without sugar was greatly discolored and almost inedible. The results are in accord with those of Diehl[3, 4] and Joslyn[10] in indicating that the use of syrup is preferable to that of dry sugar because of the better preservation of color, flavor and texture.

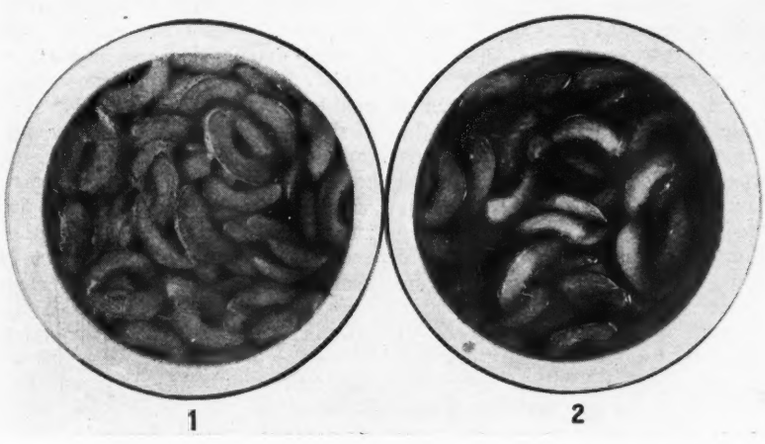

Fig. 1—Two pans of defrosted frozen Elberta peaches that were packed in 50 per cent syrup. No. 1 was packed in a tin container. No. 2 was packed in a paper container.

Effect of Chemical Treatments Upon Discoloration—Since one of the outstanding difficulties encountered in the freezing of peaches is the readiness with which discoloration occurs, quantities of material were subjected to a number of treatments having reduction or prevention of dissoloration as their purpose, and were then packed in syrup in the liquid-tight but not airtight paper cups. Some of the treatments employed were of such nature that they could be used only for experimental purposes; others were harmless and might be used in practical work if sufficiently effective.

The results may be summarized by the statement that none of the treatments employed was satisfactory from a practical viewpoint, since none was wholly effective in preventing discoloration either in the package or after opening and thawing without at the same time producing undesirable changes in odor and flavor. Exposure to the fumes of burning sulphur or addition of sodium bisulphite to the syrup completely prevented discoloration, but the odor and taste of sulphur were distinctly evident. Treatments with citric or hydrochloric acid, bleaching powder, common salt, hydrogen peroxide and iodine were not wholly effective in preventing discoloration and all had injurious effects upon flavor and in some instances upon appearance. Toluene very effectively prevented discoloration, but its addition to a product designed for human consumption, of course, is out of the question.

These results differ from those of Woodroof,[15] who determined the immediate effect of some of these chemical agents upon discoloration of peach tissue by examining the material after six hours' treatment. The present work is concerned with the ultimate effects of these treatments as seen when the material is thawed and ready for consumption, and indicates that none of them will effectively prevent discoloration without injury to the product in other respects.

Effects of Type of Container Employed—In material examined while still frozen, preservation of color in all cases was better in the hermetically sealed containers (tin cans). In many instances there was no perceptible discoloration; when present it was limited to faint browning of the surface of the fruit in the topmost layer. In the fruit packed in paper cups the darkening of the surface layer, except in a few varieties, was considerably greater and frequently extended into the second or third layer of slices.

In fruit thawed in sealed cans prior to opening, no color change occurred during thawing, and odor and flavor were normal. Thawing in paper cups was accompanied by decided darkening of the fruit at the surface, extension of the darkened area more deeply into the container and distinct browning of the syrup. The odor and flavor were in many cases distinctly altered. While a few varieties, as will be pointed out later, were fairly acceptable in appearance when packed in paper cups, these changes were evident in most of the material in paper cups to a degree which would provoke unfavorable comment by consumers. Fruit thawed in tin, when opened and emptied into pans, began to discolor upon exposure to air, but required three to six hours to reach a condition like that found in paper containers of the same variety at opening.

The hermetically sealed containers preserved satisfactory appearance, odor and flavor of the fruit during storage and thawing and for such a period as would ordinarily elapse between thawing and consumption of the fruit. The non-airtight containers permitted some degree of discoloration prior to thawing, which became much more pronounced during thawing and was attended in many cases by undesirable changes in odor and flavor. These differences in results with the two types of containers are clearly attributable to the fact that the non-airtight container permits access of oxygen from the air to the material. Fig. 1 indicates the degree to which the access of oxygen affects a variety which is rather prone to discoloration.

Effect of Rate of Freezing—Comparison of material frozen slowly in a 16-18 deg. room with that very rapidly frozen by packing in solid carbon dioxide developed some interesting and in part unexpected facts. The rapidly frozen material invariably thawed more quickly than the slow-frozen material, obviously as a consequence of the much smaller size of the ice crystals. In the hermetically sealed containers, rapidly frozen and slowly frozen fruit was in most of the varieties indistinguishable in appearance, texture and flavor, both before and after defrosting; in a few varieties the rapidly frozen fruit was slightly darker in color than the slowly frozen. In paper containers opened while still

frozen, the rapidly frozen material was in all varieties distinctly darker in color than slow-frozen, and this difference became more pronounced during and subsequent to defrosting. Probable reasons for the more pronounced and general discoloration in the rapidly frozen lots have been suggested by the authors in another publication.[11] Odor, flavor and texture were identical in rapidly frozen and slow-frozen material of the same variety. These results are in accord with those reported by Morris and Barker,[12] working at the Low Temperature Research Station at Cambridge, England, in a paper received since the present article was written. These experimenters compared peas, potatoes, asparagus, green beans, strawberries, raspberries, cherries, and plums frozen at 14 deg. F. with check lots frozen at —4 deg., —18 deg., —94 deg. F. and in liquid air, finding no advantages from the use of the lower temperatures. They conclude that for fruits and vegetables the value of quick-freezing is open to serious question.

Variety as Affecting Quality of Product—Eighteen varieties of peaches were employed in the work. They included four white-fleshed varieties and fourteen yellow-fleshed varieties, which are listed in Table I. Three of these, A1, Paragon, and Up-to-Date, are varieties originating in New Zealand and introduced by the Office of Foreign Plant Introduction; the others are well-known commercial or home orchard varieties. The results of the comparisons of the defrosted material from paper containers are summarized in Table I.

White-fleshed varieties used are very unpromising material for frozen-pack preservation. Material packed in hermetically sealed containers and thawed prior to opening had very good color at opening but darkened rapidly after opening. In the non-airtight containers there was considerable discoloration in the frozen material, which became pronounced on thawing. Discoloration was most rapid and intense in Carman; Belle and Hiley were less dark but were very poor in flavor. All three were soft in texture. Champion was fairly satisfactory in flavor and texture but darkened decidedly during thawing.

The yellow-fleshed varieties differed widely, ranging from excellent to very poor. J. H. Hale, Reeves, Chairs, St. John and Up-to-Date were distinctly superior to the other varieties, ranking closely together in texture, flavor and freedom from any serious discoloration when packed in paper containers. There were small individual differences between varieties. J. H. Hale was especially attractive in appearance because of the bright red streaking and stippling of the deep yellow flesh. Chairs darkened slightly more than the others of this group, and St. John was rather soft in texture, but there was satisfactory preservation of characteristic varietal flavor in all five varieties; and color, odor and texture were good to excellent. It was felt that the material of these varieties unquestionably would meet with consumers' approval.

Early Crawford, Late Crawford, and A1 form a second group ranking very closely together but not quite equaling the members of the first group. All of them showed more browning in paper containers than did the first group, Late Crawford browning somewhat more than the others. Characteristic varietal flavor was best preserved in Early Crawford, but the fruit softened rather badly on thawing. While not equal to the product placed in the first rank, the material of these varieties was superior both in appearance and flavor to commercially packed peaches purchased in the Washington markets for comparative purposes, and consequently would meet existing market standards. In the hermetically sealed containers, all three varieties were satisfactory in color, flavor and texture.

The outstanding importance of Elberta in commercial orchards makes it certain that practical work with the freezing of peaches will be in large part concerned with this variety. Especial attention consequently was given in this study to the effect of the stage of maturity upon the product. The quality of the frozen product varied with the stage of maturity, the less mature fruit being firm or somewhat tough in texture. It was lacking in distinctive flavor, had an oxidized taste, and was severely discolored. That packed at full eating ripeness was best in flavor, was soft and melting in texture, yet free from excessive breaking down of the pieces, but was moderately browned. At this "best" stage the product was ranked by all who examined it somewhat below the varieties thus far named. It was not equal in appearance and was distinctly inferior in flavor to the products made from the varieties of the first group, and was not as good in flavor and no better in appearance than the products made from the varieties of the second group.

The remaining varieties, Niagara, Capt. Ede, Rochester, Slappey, and Paragon, were ranked below Elberta. Each was deficient in one or more essential respects. Niagara and Capt. Ede had good texture and fair flavor but were badly discolored. Paragon was fairly good in flavor but was too firm in texture and became considerably browned. Rochester did not discolor excessively but was rather soft in texture and lacking in characteristic flavor. Slappey was browned badly, was rather tough, had lost most of its characteristic flavor and had acquired the abnormal flavor characteristic of oxidized fruit. While Rochester and Slappey were somewhat inferior to the others of this group, none of the five yielded a product of acceptable market appearance and table quality. Fig. 2 gives an idea of the range of difference in appearance found in the group of varieties.

The results obtained in the comparative study of these eighteen varieties strongly emphasize the importance of variety as a factor in determining the quality of frozen-pack products. Five of the eighteen yielded entirely satisfactory products in point of color, texture and flavor. Three others gave products of acceptable appearance and quality, although not equal to those of the first group. Elberta was satisfactory in appearance but somewhat deficient in flavor. These nine varieties appear promising for frozen-pack purposes. The remaining nine, five yellow-fleshed and four white-fleshed, appear to have little or no possibilities for such use, as, in addition to proneness to discoloration, each of them is deficient in some one or more of the factors of color, texture and flavor requisite in a product of acceptable market quality.

The results of examination of the duplicate lots of material packed in hermetically sealed containers do not alter the general conclusions as to the possibilities of the various varieties. Protection of the material against entrance of oxygen while frozen or during

Table I—Condition of Material Packed in 50 Per Cent Syrup in Paper Containers, After Defrosting

Variety	Color	Amount of Darkening	Flavor	Texture	Comparative Rank
Yellow-fleshed					
J. H. Hale	Excellent	Very slight	Very good	Very good	1
Reeves	Good	Slight	Good	Very good	1
Chairs	Very good	Moderate	Very good	Good	1
St. John	Excellent	Slight	Good	Rather soft	1
Up-to-Date	Good	Slight	Very good	Good	1
Early Crawford	Very good	Moderate	Good	Fair	2
A 1	Good	Considerable	Very good	Good	2
Late Crawford	Good	Moderate	Good	Good	2
Elberta	Fair	Moderate	Good	Fair	3
Niagara	Fair	Very brown	Good	Good	4
Capt. Ede	Very good	Pronounced	Good	Good	4
Paragon	Very good	Moderate	Fair	Fair	4
Rochester	Fair	Moderate	Poor	Fair	4
Slappey	Dull, poor	Pronounced	Fair	Poor	4
White-fleshed					
Belle	Poor	Moderate	Fair	Poor	4
Carman	Poor	Pronounced	Poor	Poor	4
Champion	Poor	Moderate	Fair	Good	4
Hiley	Fair	Moderate	Poor	Poor	4

thawing gave better preservation of color and prevented darkening, hence increased the attractiveness of the product. But it did not materially affect the texture of the fruit or the preservation of characteristic flavor, and consequently did not raise the ranking of the nine varieties which were deficient in these respects.

These conclusions are based upon the study of material grown in a single locality, at or near Arlington Farm, Va. The fruit was typical of the various varieties as grown in that locality, and was handled throughout with especial attention to uniformity in maturity and in methods of treatment of the material to be compared. A repetition of the work with the same group of varieties grown under different environmental conditions undoubtedly would result in minor differences in the ranking of the varieties through the influence of the new conditions upon the fresh material. It would scarcely result in such a radical rearrangement of the whole group as would shift promising varieties into the unpromising list, or the reverse, since so many factors are concerned in determining whether a given variety makes an acceptable product. These include depth and character of coloration of flesh, character and quantity of odorous and flavoring constituents, balance existing between sugars, acidity and astringent substances, texture of flesh, proneness to discoloration with access of oxygen, and possibly others. In so far as we have information in regard to the effect of differing environmental conditions upon these factors, groups of varieties respond in like manner and not by random.

The work is being continued and expanded during the present season, a total of 55 varieties, including commercial, home orchard, and canning and drying types being employed.

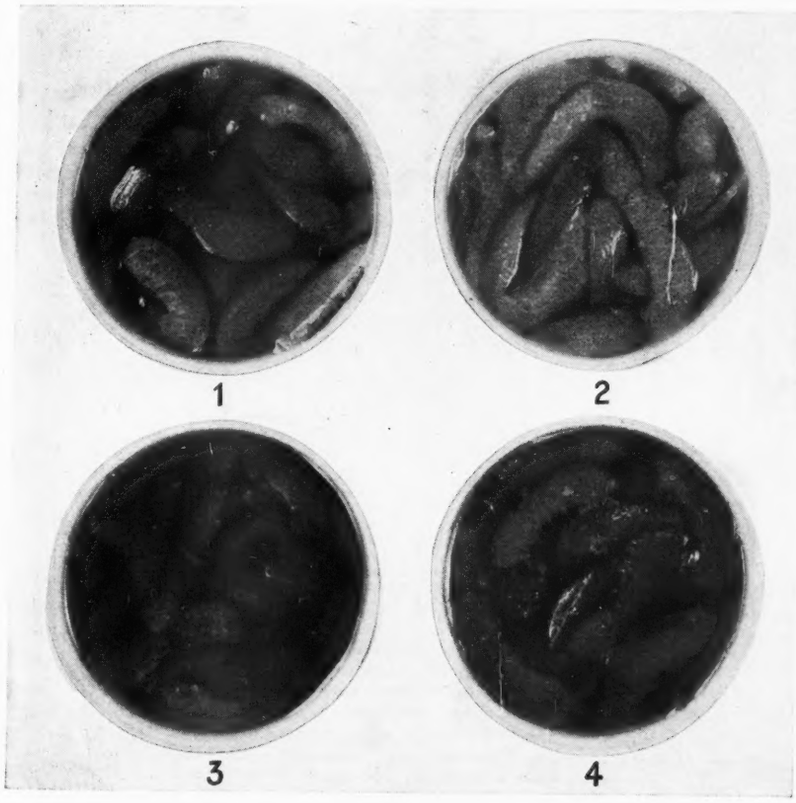

Fig. 2—Varieties of frozen peaches differ in their appearance after defrosting. These were all packed in 50 per cent syrup in paper containers. The varieties here tested were: 1, Reeves; 2, Up-to-Date; 3, Elberta; 4, Belle.

Summary

1. Variety is outstandingly important in determining market appearance and dessert quality of peaches preserved by freezing in small containers. Of the varieties employed, J. H. Hale, Reeves, Chairs, St. John, and Up-to-Date gave best results, Acceptable products also were obtained from Early Crawford, Late Crawford and A1. Elberta was only fair, while Niagara, Capt. Ede, Paragon, Rochester, Slappey, Belle, Carman, Champion and Hiley produced distinctly inferior and doubtfully marketable products.

2. The best stage of maturity for use was determined as being nearly full eating ripeness.

3. The use of hermetically sealed containers resulted in better preservation of color by preventing browning, which was of more or less general occurrence in containers which were liquid-tight but not airtight. A few varieties do not readily discolor; hence retained good color in non-airtight containers.

4. Extremely rapid freezing is not essential to successful preservation of peaches and the product shows no advantages over that obtained by ordinary freezing. The freezing temperatures available in most cold-storage plants are adequate for freezing peaches in small containers.

5. Various treatments designed to reduce or inhibit darkening were tried. The results were negative in that treatments which effectively prevented discoloration injuriously affected odor and flavor to a degree which precludes their use.

6. Material packed in 50 per cent syrup was uniformly of better texture and flavor than that in 30 or 70 per cent syrup. The syrup packs were superior in all respects to those made in dry sugar or without addition of a sweetening agent.

Literature Cited

[1]Cruess, W. V., and Marsh, G. L., 1931. Fruit products conference at the University of California. *Fruit Products Journal*, 10:204-206, 225; March.

[2]Culpepper, Charles W.; Caldwell, Joseph S.; and Wright, R. C., 1928. "Preservation of Peaches for Use in the Manufacture of Ice Cream." U. S. Dept. Agr. Tech. Bull. 84, 14 pp.

[3]Diehl, H. C., 1927. "Barreling and Freezing of Berries." Ann. Report Oregon State Hort. Soc., 19:28-35.

[4]Diehl, H. C., 1930. "Freezing of Fruits and Vegetables Requires Research." *Food Industries*, 2:162-164.

[5]Diehl, H. C., 1930. "Preserving Fruits and Vegetables by Freezing." *The Canner*, convention number for 1930, Part 2, 119-127.

[6]Diehl, H. C.; Magness, J. R.; Cross, C. R.; and Bonney, V. B., 1930. "The Frozen Pack Method of Preserving Berries in the Pacific Northwest." U. S. Dept. Agr. Tech. Bull. 148, 37 pp.

[7]Joslyn, M. A., and Cruess, W. V., 1929. "Freezing Storage of Fruits and Vegetables for Retail Distribution in Paraffined Paper Containers." *Fruit Products Journal* 8, Nos. 7-8, March-April.

[8]Joslyn, M. A., 1930. "Preservation of Fruits and Vegetables by Freezing Storage." Univ. Calif. Coll. Agric. Circ. 320. 35 pp.

[9]Joslyn, M. A., 1930. "Principles and Practice of Preserving Fruits and Fruit Products by Freezing." *Ice and Refrigeration*, 79:215-217.

[10]Joslyn, M. A., 1930. "Why Freeze Fruit in Syrup?" *Food Industries*, 2:350-353.

[11]Lutz, J. M.; Caldwell, Joseph S.; and Moon, H. H., 1932. "Frozen Pack: Studies on Fruits Frozen in Small Containers." *Ice and Refrigeration*, 83:111-113.

[12]Morris, T. N., and Barker, J., 1932. "The Preservation of Fruits and Vegetables in the Frozen State." Report of the Food Investigation Board for the Year 1931. Dept. of Scientific and Industrial Research (England), pp. 129-133.

[13]Turnbow, C. D., and Cruess, W. V., 1927. "Investigations on the Use of Fruits in Ice Cream and Ices." Univ. Calif. Coll. Agric. Bull. 434, 38 p.

[14]Wiegand, Ernest H., 1931. "The Frozen-Pack Method of Preserving Berries." Oregon Agric. Exp. Sta. Bull. 278, 42 p.

[15]Woodroof, J. G., 1930. "Preserving Fruits by Freezing." I. Peaches. Ga. Agric. Exp. Sta. Bull., 46 p.

[16]Woodroof, J. G., 1931. "Preservation Freezing: Some Effects on Quality of Fruits and Vegetables." Ga. Agric. Exp. Sta. Bull. 168, 23 pp.

Some Factors Affecting Supply and Price of Butter

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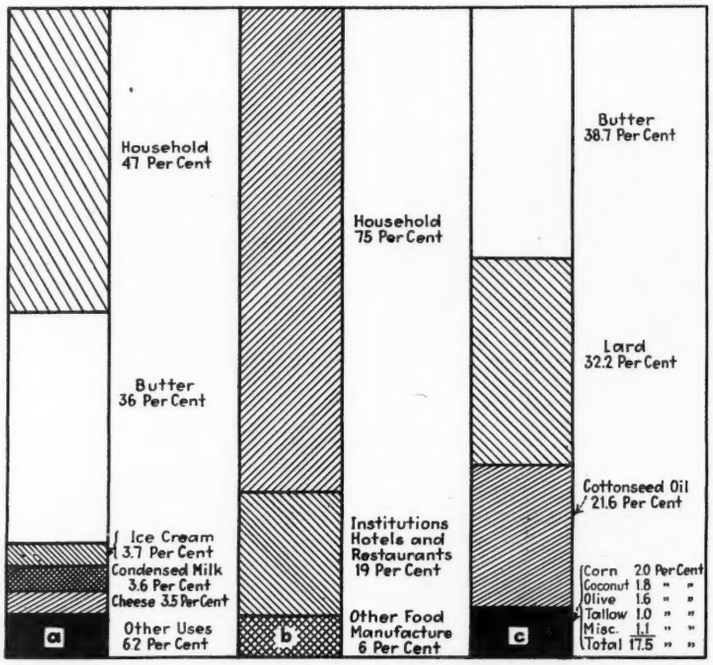


(a) Principal uses of milk. Consumption of butter fat is nearly, though not exactly, in proportion to the use of milk. Data shown are based on estimates by Bureau of Agricultural Economics. (b) Where butter is used. Estimates by *Food Industries*. (c) United States consumption of edible fats and oils. Data by Foodstuffs Division, Department of Commerce (see E. G. Montgomery, *Food Industries*, November, 1930, p. 511).

BUTTER is a peculiarly important food both to producers of dairy products and to users in industry and in the household. Many factors affect the supply and the market price. These factors appear much better understood among the traders in this commodity than among either the producers or industrial users. They appear to deserve far more consideration as a basis in the formulation of butter-buying policy than is now accorded them.

Substantially all of the milk produced which is not required for the fluid milk and cream market or for manufacture of other dairy products becomes raw material for butter making. Hence butter is a stabilizing balance wheel for the entire dairy products business. Serving in this capacity, it must provide for much of the wide seasonal surpluses in milk supply; it must accommodate itself to the problems of storage; and it must accept a price invariably containing an important seasonal factor. In an earlier article, some of these factors have already been brought out, but they are so important to a clear understanding of the problems of butter as an independent commodity that they will stand repetition as a part of the following discussion (see *Food Industries*, September, 1932, pp. 304-307). Two sets of factors demand consideration, those inherent within the butter industry itself and those wholly foreign to butter making. The internal factors deserve first consideration.

The seasonal variation in milk production is, of course, generally known; but few probably recognize the fact that the summer output of milk is approximately 50 per cent greater than the winter production (see Fig. 1). Consumption does not vary by anything like as large a percentage. Butter manufacture, therefore, must utilize a much larger quantity of butter fat in the summer than at any other time of the year. And there is no economic justification for attempts to offset this seasonal characteristic, since it results from nature's provision that much the largest number of cows will freshen at a season when feed in the form of pasturage is most abundant. Economic relations between feed cost and the food value of either meat or milk produced therefrom demand a continuance of this natural relationship.

The direct and inevitable consequence of seasonal milk production is a seasonal surplus of butter production, with resulting seasonal movement of butter into storage (see Figs. 2 and 3). There is, of course, a compensating seasonal flow out of storage during the periods of lower production. That there should be a corresponding seasonal fluctuation in the market price is, of course, to be expected (see Fig. 4).

The price of butter at the point of production, assuming profitable operation, must cover the cost of the cream utilized, the cost of operation of the plant, capital cost, selling expenses, and profit. All of these items other than the cost of butter fat in the cream utilized can be considered, for convenience of discussion, as "manufacturing margin." This margin between raw material cost and the price received for butter is invariably much less than the cost of the butter fat; and it is more or less constant for any given plant so long as regular operation is maintained. The cost of the butter fat, on the other hand, varies widely, but this is caused principally by the variation in the market price of butter. A few examples with hypothetical cost figures serve to illustrate the significance of these elements.

Let us suppose as Case 1 that a creamery is paying for cream at the rate of 25 cents per pound of butter fat contained. Let us also assume that in this plant it requires about 5 cents per pound of butter for the total manufacturing margin. The purchased pound of butter fat will produce ap-

"Charting the Trends in the Dairy Products Industries," by R. S. McBride, in *Food Industries*, September, 1932, pp. 304-307, includes other charts and studies pertinent to butter production and price.—EDITOR.

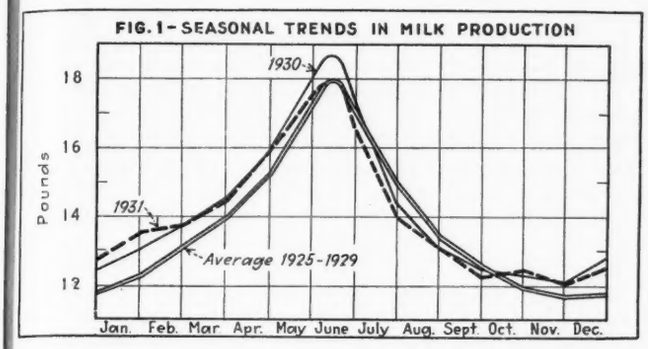
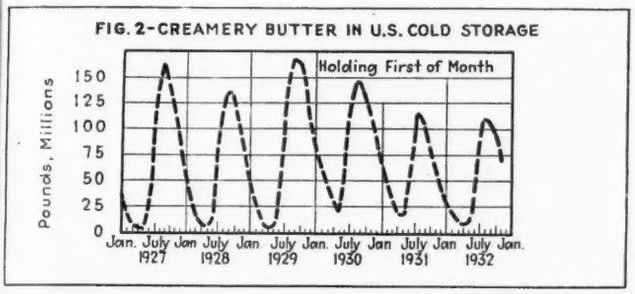
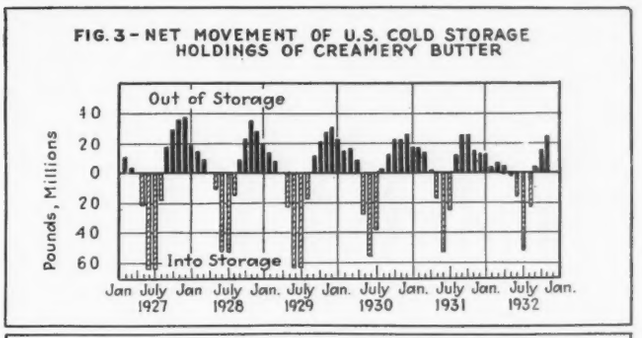
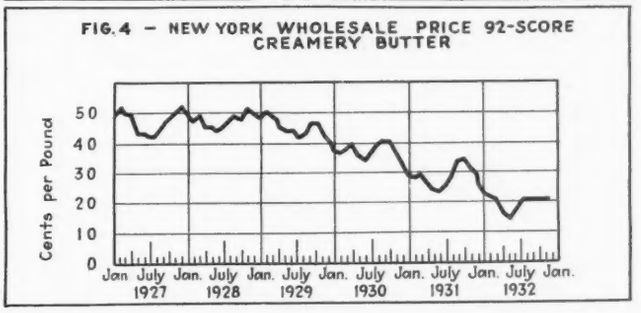


Fig. 1—Milk production per cow has a distinct seasonal trend, due largely to feed and pasture conditions and to time of freshening. Over a period of years there has been a tendency for the production per cow to increase through selection or closer culling of herds, and through improvement in herd management. Present low prices for beef have temporarily halted close culling.







Figs. 3 and 4—Creamery butter usually goes into storage during the months of May, June, July and August—the months of greatest production. The greatest withdrawals occur usually during the months of November and December—the period of low production. As a result of some shift from summer to winter dairying, the margin between seasonal low prices and seasonal high prices has been decreasing in recent years.

proximately 1.25 lb. of butter, 80 per cent of butter being fat and 20 per cent being salt, water and curd. Under the conditions here assumed a pound of the finished butter will sell at 20 cents for raw material (0.8 x 25) plus 5 cents for manufacturing margin, or 25 cents. In this case, therefore, butter is sold for just as much per pound as the butter fat from which it is manufactured.

For Case 2 let us assume that butter fat is currently purchased at 35 cents per pound and that the same 5 cents per pound is an adequate manufacturing margin. Under these conditions a pound of butter must sell at 33 cents, or 2 cents lower per pound than the fat from which it is made.

For Case 3 let us assume that butter fat is very cheap, currently in our hypothetical location commanding only 15 cents per pound. Here, then, if the manufacturing margin remains constant, one must sell his butter for 17 cents per pound, or at a rate 2 cents higher per pound than was paid for the butter fat from which it was made.

In actual commercial practice these relationships really do prevail. A single example is shown in Fig. 5, where there are superimposed curves for the 10-year period 1922-1931 for butter fat on the farm and the price of butter at the farm. It will be noted from that curve that whenever butter was priced at more than about 40 cents per pound the farmer got more per pound of butter fat than the current price of butter. But when butter fell significantly below 40 cents the price of butter fat was lower than the price of butter, each in cents per pound. Like curves can be drawn for any locality under any desired set of economic or cost conditions which deserve study. It will be found for each such study that there is some typical price level at which butter fat and finished butter become about equal in price per pound. In most areas of large dairy-product production this level lies between 20 and 30 cents. In a few areas the level of equal prices is higher. In the chart shown, the very high level for equal prices, 40 cents, is the result of the fact that the particular data shown relate to farm conditions and not to large-scale manufacturing enterprises.

"Overrun" in manufacture is, of course, a highly significant characteristic of the industry. Overrun is the excess in weight of the finished product above the weight of the raw-material butter fat used. For a perfect factory furnishing precisely 80 per cent of butter fat content in the butter made, the overrun would be 25 per cent (80 lb. of butter fat plus 20 lb. of salt, water, and curd, making a theoretical 100 lb. of finished butter, or a 25 per cent overrun). In commercial dairy practice the overrun closely approximates this theoretical value. It usually lies between 22 and 24 per cent. It drops below 25 per cent principally because of processing losses, including the loss of butter fat in the buttermilk and spillage.

External factors affecting butter prices are numerous. The current ratio between production and consumption, of course, is dominant. Whenever production exceeds current consumption there must of necessity be movement into storage. Such movement involves the handling cost, prospective storage charges, and certain deterioration of quality during storage. The producer naturally would prefer to take a slightly lower price for his production immediately than to incur these costs and risks. Even a very small surplus in current production, therefore, occasions rather a sharp change in price of much larger percentage in magnitude than might at first seem logical. The desire of owners of butter in storage to remove it, canceling storage costs and stopping depreciation in quality, is great. Hence any surplus in demand above current production results very promptly in movement out of storage. A small price differential, therefore, suffices to occasion a large movement in this direction.

Numerous attempts have been made by economic analysts to find the basic economic factor affecting butter price. Repeatedly their studies have shown that the price of butter changes almost proportionately with national income as gaged by factory payrolls. (This relationship, of course, applies to the wide movement of butter price that is independent of seasonal considerations.) But it should be noted that the price of other agricultural commodities taken as a group or the price of all manufactured commodities does more or less the same thing. It appears to be a

mistake, therefore, to conclude that the price of butter is anything peculiar or distinctive in this particular; it actually is much like the price of other essential commodities of *general* use.

The per capita consumption of butter does not change very much from year to year; certainly it is not largely affected by good times or bad. This is a surprising conclusion and one distinctly contrary to the impression that we spread our bread thicker with butter in times of large income. The fact seems to be that we spend about a constant percentage of our income for butter, speaking nationally, and that the butter maker and supplier of cream for butter making therefore get less per capita from us in hard times than in boom periods. But they make, and nationally we eat, approximately 17.75 lb. per year per capita regardless of the "times." This would be a very fortunate thing for the industry were it possible to have *all* of the elements of cost, such as feed, farm labor, transportation and factory labor, simultaneously varying by the same percentage. Such a Utopia for the butter maker has not yet arrived.

The butter market is highly competitive. The competition is not only between companies and between different dairy districts. It is far wider than that. It extends to a competition between butter and other edible fats and demands a consideration of import or export quantities and the tariffs which encourage or retard these international movements. A very small differential in price between one market and another is promptly adjusted by the physical movement of sufficient butter to restore price equilibrium. A most striking example of this is to be seen in the quick response of imports for domestic consumption to a price differential between the New York market and either the Danish or the New Zealand market, from which substantial parts of our imported butter come (see Fig. 6). Whenever this price differential is equal to the tariff, import promptly takes place. And when the differential exceeds the tariff level, the import volume increases many fold almost immediately. This is important, even though the total quantity received may be a small percentage of the total used in the United States.

Considering international competition in butter demands that one give careful attention to qualities and grades as well as to mere quantities of total shipment. The United States finds it economically desirable to export substantially only low-grade butter, as in the markets reached there appears to be relatively larger demand for low-score goods. That movement, therefore, is not directly dependent on prevailing market prices for table grade or the better manufacturing grades. Our imports are almost wholly of the high-grade butters which become competitive with domestic production scoring 90 or more.

At this point it is worth while again to emphasize the fact that generalizations regarding butter are likely at any time to be incorrect either with reference to certain geographic areas, certain qualities of butter, or certain seasonal or economic conditions. To make a generalization correct for all conditions would require so many qualifying clauses as to make the statement cease to have general meaning. Readers of this discussion should, therefore, be extremely cautious in undertaking to apply generalizations to particular cases.

Market quotations for butter are affected by one limiting factor that does not usually enter into quotations for commodities. As a matter of fact, it is rather difficult to say just what must be the real basis of a market quotation, because so large a part of the marketing is done under contracts which provide for a price dependent on current quotations. It is customary, for example, for a producer of premium grades to contract for the marketing of his output on the basis of 1 cent or 2 cents above the prevailing price at New York, Chicago, or other near-by market. Certain markets are more important for certain grades than others. If a large part of the goods changing ownership in any market moves under such contract, then one wonders whether the market is fixing the price or the price is fixing the market. Actually in the last analysis it is the judgment of the government or other quoting authority, as to the basing price, that has governed market transactions; and this includes many considerations; not alone the dollar-and-cent value of goods that are changing hands at the moment.

Buying and selling of "futures" is still another important factor which may affect the buying policy of a large butter user. As a matter of fact, the composite judgment of the traders in the market, which fixes the price of butter for future delivery, is perhaps the best available gage of impending price changes. As a result of long experience, skilled traders are able to weigh with fair accuracy the effect of different factors affecting supply and demand months hence. The result of their composite judgment is the prevailing price for future deliveries.

A buyer-user may himself contract for such futures and thus express his sentiment that the forecasts of the trading group are unduly pessimistic as to futures prices. Or the user may buy and store butter in anticipation of future needs. Or, as another possibility, he may depend wholly on supplies currently purchased and held only for a short time before use. In adopting such short-view policy he expresses the judgment that the forecasts of

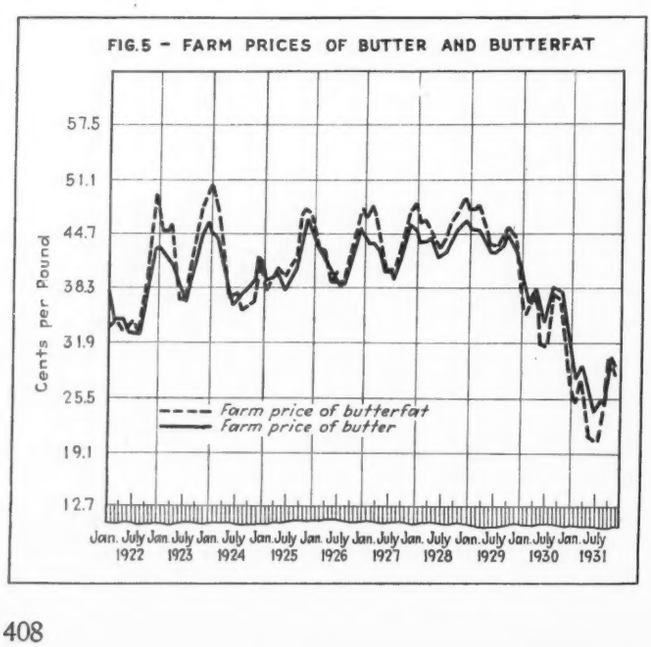


FIG.5 - FARM PRICES OF BUTTER AND BUTTERFAT
Cents per Pound
57.5
51.1
44.7
38.3
31.9
25.5
19.1
12.7
Farm price of butterfat
Farm price of butter
Jan. July Jan. July Jan. July Jan. July Jan. July Jan. July Jan. July Jan. July Jan. July Jan. July
1922 1923 1924 1925 1926 1927 1928 1929 1930 1931

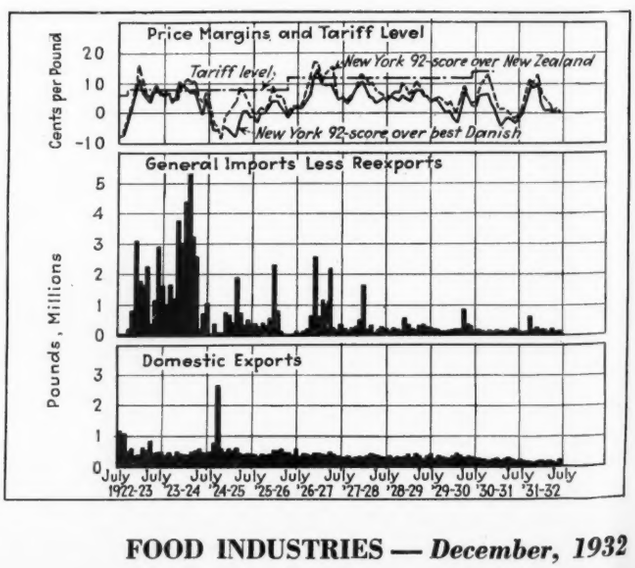


Fig. 6—Butter imports and exports have declined in the last ten years. Trade tends to fluctuate in volume according to relative prices in foreign and domestic markets.

future price are too high and that by waiting he can buy his supplies as needed at lower than the price indicated in the futures market.

Storage of some butter for considerable periods is, of course, unavoidable. The cost varies with conditions, amounting to perhaps ¼ cent per pound per month in storage. A great deal of butter moves into owned storage warehouses for only a relatively short time and is then removed to be replaced by a fresh stock. The object of this changing of stocks is, of course, to minimize the depreciation of butter and to avoid conversion from the class of "fresh" to the class of "storage" goods. However, since mere handling of it into storage and out again creates a significant cost, it is usual for this interchange of storage stocks to take place at a time not earlier than 30 days after initial storing.

Goods held longer than 30 days in storage, unless of unusually good keeping quality, may require marketing in a lower-price class. That contingency, of course, is avoided by the owner wherever possible. Speaking generally, it is uneconomic to hold any considerable stock of butter in storage for a period longer than six months. The upper limit of economic storage on any given lot of butter in normal trade practice is certainly not over ten months.

Quality considerations affect market price greatly. But it is not alone the absolute quality that is important to the purchaser. Uniformity in quality as between different shipments or as between different parts of a single shipment are of almost equal concern to the purchaser-user. It is for this reason that centralizing and classifying agencies have attained such great importance in the butter industry. One of the most conspicuous examples of this importance is to be found in the history of the Danish butter industry. That country, unable to continue as a large grain exporter, became a large producer of dairy-products surpluses, notably butter, during the years following the Civil War in the United States. For a considerable time its markets were seriously curtailed because of lack of uniformity. Only when a single selling agency, classifying and shipping uniform quality under each designation, became effective in the Danish butter business did that country become an important factor in world supply.

More recently in the United States there have been numerous examples of similar achievement following cooperative effort in the fixing and enforcing of uniform quality standards. The operations of the cooperatives in similar effort to establish quality standards for sweet-cream butter are, of course, widely recognized. Purchasers changing from one source of supply to another have often learned to their sorrow the importance which attaches to such uniformity and the difficulty which results from its absence. Butter makers already well understand the importance of this property.

Other fats and oils unquestionably are competitive with butter. However, this competition apparently results in an effect on price rather than a change in total consumption. All of these factors should by the individual food executive be weighed in terms of probable butter price in 1933. Forecasts of that price at this place would be wholly out of order. However, it is worth while to mention the direction of the effect of a few important influences.

1. If the apparent improved conditions of employment and of wage-earner income continue into next year the result should be a general stiffening of commodity prices and a corresponding, though perhaps not equal percentage, increase in butter price.

2. There is a very large milch cow population, implying for next year an abundance of milk supply.

3. The price of beef relative to the price of feed does not at present indicate any likelihood of increased culling of herds by slaughter; certainly such culling will not take place in sufficient degree materially to affect milk supply during the first half of the year.

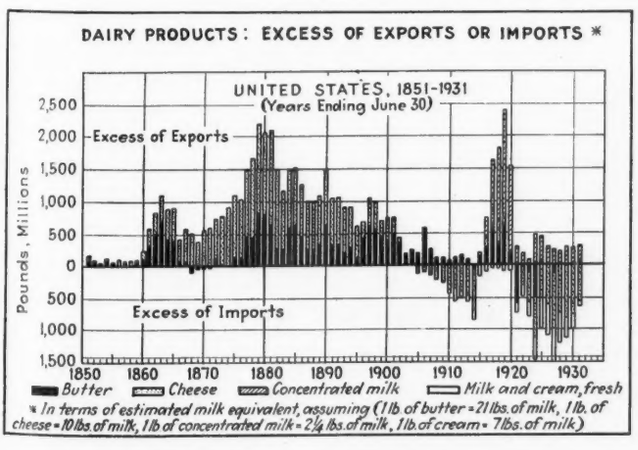
4. For three years past the pasture conditions have been far below normal. There is every reason to believe that better pasture conditions will prevail next year, merely from the laws of probability and chance. If pasture improves, milk production per cow may also improve, especially if feed prices rise relatively less than meat or animals for slaughter.

5. Imports of butter do not at the moment appear to threaten any serious influence, even though the effect of depreciated foreign currencies should become even worse than now. The margin between the United States prices and the prices in other markets from which import might take place is such as certainly to imply little or no significant import.

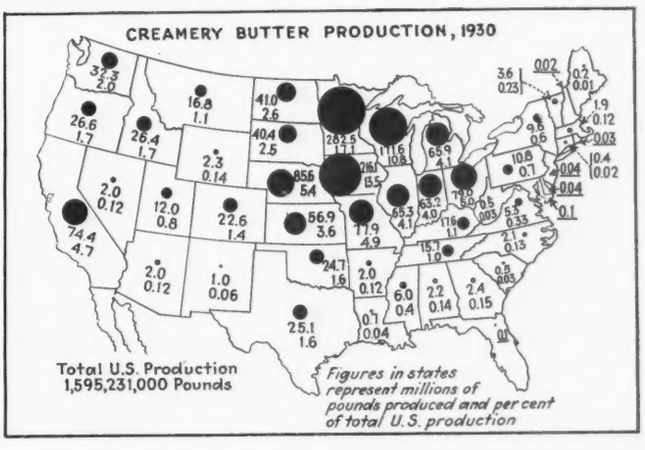
6. And finally, in considering all matters of price of butter, one should recognize that today freight on both cream and butter, all capital costs and selling expenses involved, and other charges more or less fixed per year are today a much greater percentage of the total cost of butter delivered to the user than for many years past. A substantial percentage increase in the cost of butter fat might, therefore, take place without producing an equal percentage increase in the delivered price of butter.

FOOD INDUSTRIES and the author again acknowledge with pleasure the cooperation afforded by the technical specialists at the Bureau of Agricultural Economics regarding this manuscript, and the courtesy afforded by that Bureau in furnishing a portion of the charts here reproduced.

Total exports of butter and cheese reached a peak about 1880, then declined gradually until 1914. Large quantities of dairy products, mainly concentrated milk, were exported during the War. Since the War, concentrated milk has comprised the bulk of the exports. Imports since 1920 have been mainly of cheese.



The bulk of the domestic butter supply is produced in the Middle West. The states of Minnesota, Iowa and Wisconsin—named in order of their importance—produced about 42 per cent of the total domestic creamery butter in 1930. Creamery butter production in the South is relatively small, although it is being gradually expanded there. Most of the milk produced in the Northeastern states is used as whole milk or cream in adjacent urban centers.


CREAMERY BUTTER PRODUCTION, 1930
Total U.S. Production
1,595,231,000 Pounds
Figures in states represent millions of pounds produced and per cent of total U.S. production

Canadian Tariff Increases Preferential for British Foods

EFFECTIVE Oct. 13, Canada took first steps in carrying out the terms of her preferential tariff agreement made with Great Britain during the Ottawa Imperial Economic Conference in August. Changes in margin of preference were made on 262 out of the 807 items on the Canadian schedule. Of this number, 76 were placed on the free list and 57 were given lower rates. In the main, preferential advantage was given British-origin products by increases in duty rates on the products of the United States and other non-treaty countries.

This action is in accordance with the Canada-United Kingdom agreement of Aug. 20 in which Canada, during a 5-year term, was to give United Kingdom producers full opportunity of reasonable competition in the Canadian market. Such competition was to be on the basis of relative cost of economical and efficient production, provided that special consideration be given to industries not fully established. Provision was made also that tariff protection against United Kingdom products would be given only to those industries which have reasonably sound opportunities for success.

Further provision stated that all existing surcharges on imports from the United Kingdom shall be abolished by the Canadian Government as soon as the finances of Canada will allow and that consideration be given to reduction and, ultimately, to abolishment of the exchange dumping duty now applying to imports from the United Kingdom.

In the following table are listed the present changes which affect or pertain to foods. Comparisons are made between the new and the old rates in each case, both for the general rates which apply to the United States and other non-treaty foreign countries and separately for the British preferential rates that are to apply to the products of the United Kingdom and other parts of the British Empire. Included is the total margin of preference now granted British-origin foods in the Canadian markets over foreign-origin foods.

Tariff Item	Commodity	General Rates (Apply to U. S. and Other Non-Treaty Countries) New	General Rates (Apply to U. S. and Other Non-Treaty Countries) Old	British Preferential Rates New	British Preferential Rates Old	Margin of Preference
20a	Butter produced from the cocoa bean	3c. per lb.	2c. per lb.	Free	Free	3c. per lb.
39a	Rice flour, sago flour, cassava flour, tapioca flour and rice meal	1¼c. per lb.	1c. per lb.	¾c. per lb.	¾c. per lb.	½c. per lb.
77b	Vanilla beans, crude only	10 per cent	Free	Free	Free	10 per cent
83	Potatoes in natural state	75c. per 100 lb.	75c. per 100 lb.	Free	Free	75c. per 100 lb.
87n	Tomatoes	2c. per lb.	.....	.....	.....	2c. per lb.
106	Fruits, prepared in airtight cans or other airtight containers, weight of container to be included in the weight for duty: (b) Pineapples	5c. per lb.	5c. per lb.	1c. per lb.	3c. per lb.	4c. per lb.
135b	Sugar above No. 16 Dutch standard, 98 to 99 deg. polarization, when imported or purchased in bond in Canada by a recognized sugar refiner for refining purposes only	No change	147.6c. per 100 lb. for sugar over 98 deg. polarization	31.64c. per 100 lb. (formerly confined to Australia under 135)	35.6c. per 100 lb. for sugar over 98 deg. polarization	115.96c. per 100 lb.
152	Lime, juice, fruit syrups and fruit juices, n.o.p.[1]	25 per cent	22½ per cent	15 per cent	17½ per cent	10 per cent
159	Spirits and strong waters, such as extracts, essences or spiritous fruit essences[1]	No change	$10 per gal. and 30 per cent ad val.	$8 and 30 per cent ad val.	$10 and 30 per cent ad val.	$2 per gal.
168	Malt flour containing less than 50 per cent in weight of malt; malt syrup or malt syrup powder; extracts of malt, fluid or not; grain molasses	10c. per lb. and 35 per cent ad val.	5c. per lb. and 35 per cent ad val.	3c. per lb. and 20 per cent ad val.	3c. per lb. and 25 per cent ad val.	7c. per lb and 15 per cent ad val.
207a	Blood albumen	No change	10 per cent	Free	5 per cent	10 per cent
208o	Cream of tartar in crystals and tartaric acid crystals	10 per cent	Free	Free	Free	10 per cent
215	Stearic acid, n.o.p.[1]	No change	20 per cent	Free	12½ per cent	20 per cent
232	Glue, liquid, powdered or sheet, and gelatin, n.o.p.[1]	25 per cent ad val. plus 5c. per lb.	27½ per cent ad val. plus 3c. per lb.	No change	17½ per cent ad val. plus 2c. per lb.	7½ per cent ad val. plus 3c. per lb.
232c	Gelatin, edible	35 per cent	27½ per cent	10 per cent	17½ per cent	25 per cent
254	Gums, viz.: arabic, Australian, mastic, Senegal, gedda; gum chicle or sappato-gum, crude; Pontianac	15 per cent	Free	No change	Free	15 per cent
264	Essential oils, n.o.p.[1] including bay oil, otto of limes, and peppermint oil	No change	7½ per cent	Free	5 per cent	7½ per cent
276b	Cottonseed and crude cottonseed oil, when imported by manufacturers of cottonseed meal and refined cottonseed oil	10 per cent	Free	No change	Free	10 per cent
277	Palm and palm kernel oil, unbleached or bleached, not edible; shea butter	10 per cent	Free	No change	Free	10 per cent
278	Oils, viz.: Coconut, palm, and palm kernel, not edible, for manufacturing soap; carbolic or heavy oil; olive oil for manufacturing soap or tobacco or for canning fish	10 per cent	Free	No change	Free	10 per cent
278b	Crude peanut oil for refining for edible purposes, used as materials in Canadian manufactures	10 per cent	Free	No change	Free	10 per cent
278c (formerly 785)	Coconut oil not edible, when imported for refining	10 per cent	Free	No change	Free	10 per cent
409	Cream separators and complete parts therefor, including steel bowls	25 per cent	Free	No change	Free	25 per cent
427c	Machinery, viz.: Power churns, milk coolers, fillers and cappers; ice cream mixers, butter printers, brine tanks, milk bottle washers, and sterilizers, milk can washers, ice-breaking machines, valveless or centrifugal milk pumps, and sanitary milk and cream vats (none of the foregoing machinery to include motive power)	No change	35 pe cent	Free	15 per cent	35 per cent
599	Hides and skins, raw, whether dried, salted or pickled; and raw pelts	Free	15 per cent	No change	Free	None
689	Animal charcoal for use in refining sugar	No change	25 per cent	Free	15 per cent	25 per cent

[1]Not otherwise provided for.

WHAT'S ON YOUR MIND?

To the Editor of FOOD INDUSTRIES:

We have received the November, 1932, issue of FOOD INDUSTRIES, in which our letter to you dated Sept. 15 is published, and we have noticed an error which we wish to call to your attention. In the fifth paragraph of our letter, in which we discuss the production of alcohol for motor fuel purposes in Germany, we say in the last line as follows: " . . . has increased the alcohol consumption for *motor fuel* purposes by 3,000 per cent in two years." But the letter as printed reads: " . . . 300 per cent in two years."

DR. HENRY ARNSTEIN,
Consulting Chemist, Industrial and Efficiency Engineer,
Philadelphia, Pa.

ABSTRACTS OF CURRENT LITERATURE

PHOTOCHEMICAL ACTION, A CAUSE OF RANCIDITY. M. R. Coe and J. A. LeClerc. *Cereal Chemistry,* Vol. 9, pp. 519-522; September, 1932.

The exclusion of light retards the development of rancidity, while selective ultra-violet light hastens the development of rancidity as compared with natural sunlight. Black or green containers are a practical and effective means of protecting from spoilage food materials subject to certain types of rancidity.

* * *

CHANGES IN MILK FAT DUE TO DRYING THE MILK. K. Teichert and R. Kotterer. *Milch. Zentr.,* Vol. 61, pp. 157-158 (1932). [From *British Chemical Abstracts,* B. Vol. 51, p. 861; Oct. 7, 1932.]

Milk powder prepared from whole milk is declared to be unsuitable for the manufacture of milk chocolate because of the unpleasant taste which develops. This trouble has been traced to the rancidification of the fat after storage for a few days. Results of determination of iodine and acid values of various fats are given.

* * *

LEMON ESSENCE. Giovanni Romeo, N. Galletti and J. Amoroso. *Giornale di chimica industriale ed applicata,* Vol. 14, pp. 397-400; August, 1932.

Lemon essence, made by the genuine sponge method, has a clear yellow color, fresh lemon odor, and contains about 1.2-1.7 per cent essential oil, rarely over 3 per cent stearoptene and sometimes as high as 6 per cent citral. But the sponge method (absorbing essence from the ruptured cells in a sponge) is expensive and invites labor-saving short cuts. Mechanical treatment, being more severe, lets more stearoptene (5-7 per cent) into the essence than does hand manipulation. The machine-made essence also suffers in citral content, in odor and in color. Consumers still prefer sponge essence; but price wins a place in the market for the machine product, most of which is used in making concentrates by distillation. The real menace to the industry is imitation essence, made up from byproduct terpenes and stearoptene (from concentrating machine-made essence) and fraudulently sold as genuine. Tables of data are presented to show the superiority of genuine sponge essence over machine-made essence; and methods are described for detecting imitation essence when offered as genuine.

* * *

THE CHURN AS A SOURCE OF MOLDS IN BUTTER. H. Macy, W. B. Combs and H. B. Morrison, Jr. *Journal of Dairy Science,* Vol. XIV, No. 5; pp. 398-403.

Wooden churns found in creameries are difficult to sterilize and are, for this reason, highly contaminated with molds of many genera and species. Out of 230 samples of wood taken from Churn A, 192 contained molds of 18 identified genera and of 14 others, not producing fruiting bodies. Only 22 out of 73 samples taken from Churn B showed molds.

MERCURY VAPOR LAMP FOR ACCELERATED BLEACHING TEST. C. G. Ferrari, A. B. Croze and C. H. Bailey. *Cereal Chemistry,* Vol. 9, pp. 491-505; September, 1932.

Flour samples bleached with dibenzoyl peroxide (the Novadel reagent) usually are allowed to stand 24 to 48 hours for the completion of the reaction. A rapid control test for mill operation consists of irradiation of the sample by rays from a mercury vapor arc to accelerate the bleaching action. Thus within an hour, the test of the irradiated sample would be completed, whereas up to 48 hours is customarily required. Apparatus and experiments are described in detail.

* * *

VITAMIN D. E. M. Hume, R. B. Bourdillon and others. *Biochemical Journal,* Vol. 26, No. 2, pp. 488-530 (1932).

Technique of study of this subject is described. Tests of the stability of vitamin D in solution in olive oil show that such solutions may deteriorate seriously if kept at room temperature for periods of a year or more. Stability at 0 deg. C. is much greater, but at this low temperature as much as half the activity of the preparation may be lost in about three years. The addition of various common substances likely to be present as impurities has no very great effect, with the exception of sulphur, which causes rapid deterioration.

* * *

DIGESTIBILITY OF EVAPORATED MILK. W. B. Nevens and D. D. Shaw. *Journal of Nutrition,* Vol. 5, pp. 485-494; September, 1932.

Feeding experiments show that the protein of fresh whole milk is distinctly higher in digestibility than that of either the commercial or laboratory evaporated milks studied. Coefficients of digestibility of total solids of milk were, as would be expected, not as good as those for fat and sugar, which were almost completely digested, but better than that of protein. In spite of these differences evaporated milk was found to give excellent results in promoting growth.

* * *

STERILIZING CANNED FOODS. G. V. Hallman and R. G. Stevens. *Industrial and Engineering Chemistry,* Vol. 24, pp. 659-661; June, 1932.

The kinds of spoilage in canned foods and the types and characteristics of organisms commonly causing spoilage are discussed, with methods for their differentiation. Some sources of contamination are described. The factors involved in the determination of the times and temperatures for canned foods, such as the rate of heat penetration into the canned food product, thermal death times of common spoilage organisms, various food factors, and the initial temperature of the canned product, are discussed, with methods for their evaluation.

SOY SAUCE. Naoharu Shikazono and Yoshinori Tomoda. *Journal of the Society of Chemical Industry,* Japan (*Kogyo Kwagaku Zasshi*), Vol. 35, pp. 368-369B; August, 1932.

Soyament, a Japanese improvement over soy sauce, has a more attractive flavor than the sauce made by the old, familiar fermentation method. In making soyament, soybean cake is hydrolyzed with strong hydrochloric acid, neutralized and subjected to a short fermentation in the presence of a small quantity of a wheat component. Soyament differs from soy sauce in containing a little less water, fat and sugar, but a little more ash and a great deal more protein. Moreover, much of the protein in soyament has been hydrolyzed to amino acids. This seems to be the cause for the better flavor; hence the hydrolysis prior to fermentation is the real improvement in the process.

* * *

CHEMICAL PROBLEMS OF THE QUICK-FREEZING INDUSTRY. D. K. Tressler. *Industrial and Engineering Chemistry,* Vol. 24, pp. 682-686; June, 1932.

Desiccation and oxidation have been controlled largely by compact packaging with moisture-proof and moisture-vapor-proof materials. The leakage of moisture from thawed fish has been controlled by proper brining of the fillets in a pure salt solution. Objectionable enzyme actions in vegetables are prevented by blanching preparatory to freezing. Chemical changes in frosted fruits are prevented by packaging with sweetened juices or sugar syrups.

* * *

HEAT STERILIZATION OF FOODS. R. N. Wright, *Chemistry and Industry,* Vol. 51, pp. 699-700; Aug. 19, 1932.

Important factors of any sterilizing process are: quality and uniformity of the finished product, sterilization of the product, and economics of the process. Lower production costs follow the use of automatically controlled continuous agitating or non-agitating retorts, the type depending upon the nature of the food product inside the container. For a pasteurization process, the open-water-bath method is simply controlled, but relatively high in cost.

* * *

DEACIDIFICATION OF OILS WITH GLYCERIN. E. Schlenker. *Allgem. Oel-u. Fett-Ztg.,* Vol. 29, pp. 343-346 (1932). [From *British Chemical Abstracts, B,* Vol. 51, p. 776; Sept. 9, 1932.]

Experiments indicate that a mixture of ethyl alcohol and glycerin (e.g., 2:1) may be employed in a suitable plant to deacidify highly acid oils.

* * *

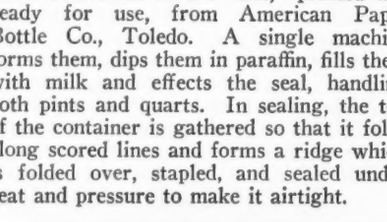
MICROORGANISMS AS AFFECTING FROZEN FOODS. C. A. Magoon. *Industrial and Engineering Chemistry,* Vol. 24, pp. 669-671; June, 1932.

Three main groups of microorganisms are responsible for spoilage of frozen foods: molds, yeasts and bacteria. The changes which are brought about in frozen-pack foods differ with the nature of the substance and with the particular organism concerned. They are both physical and chemical in nature. Alterations in texture, color, flavor and healthfulness of foods result from these microbial activities.

NEW PRODUCTS
NEW METHODS

Paper Milk Containers

"Never used before. Never used again" is the message of sanitation carried to consumers by the new Pure-Pak paper milk container recently adopted by Sanitary Pure Milk Co., Toledo. The company receives these containers in the "flat," printed and ready for use, from American Paper Bottle Co., Toledo. A single machine forms them, dips them in paraffin, fills them with milk and effects the seal, handling both pints and quarts. In sealing, the top of the container is gathered so that it folds along scored lines and forms a ridge which is folded over, stapled, and sealed under heat and pressure to make it airtight.



To obviate risk of short measure due to foaming, the filling and measuring cups draw their supply from the bottom of the holding tank.

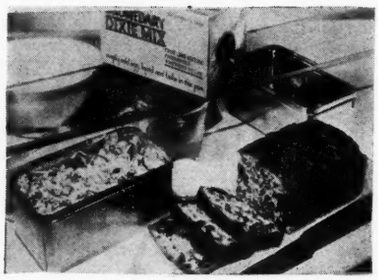
Quick-Action Jello-O

Everything from better flavor to rapid setting is attributed to a 1932 model of an 1845 gelatin made by General Foods Corp., New York. The new Jell-O was conceived in the laboratory and is made from a formula that gives it a richer fruit flavor and a composition that causes it to dissolve in water at 120 deg. F., which is 92 deg. cooler than the temperature formerly required. This enables the housewife to use lukewarm water and set her dessert in the refrigerator for cooling immediately after preparing it.

The new container, on the right, is more colorful and impressive. It has the same paraffined lining.

Prepared "Dixie" Fruitcake

"Packed in the tin you bake it in" is a slogan for a new fruitcake mixture, Dromedary Dixie Mix, packed by Hills Bros. Co., New York. Made from an old southern recipe, the cake mixture contains dates, citron, lemon and orange peels, glacé pineapple and cherries, raisins, nut meats and other ingredients. It is packaged in a yellow outer container of modern design, inside of which is a metal container that serves as the baking tin. To prepare the fruitcake for the oven, the cook only has to add an egg and one-third cup of liquid, which may be either water, milk, grape juice, orange juice, cider or other fruit juices.



Improved Grape Juice

Bottled unfermented grape juice with a flavor and aroma said to approach that of the freshly pressed product was produced during the past season by Chautauqua & Erie Grape Growers' Cooperative Association, Inc., Westfield, N. Y. The method employed involves cooling the fresh juice to a point just above freezing and then storing it in refrigerated, germ-proof tanks for blending and ageing. When ready for the bottler, the juice is filtered and pasteurized.

The Grape Growers' storage facilities consist of six 50,000-gal. concrete tanks and a number of smaller tanks. A wax lining in the tanks prevents attack by the juice.

Sauce With Meaty Flavor

It has a meaty flavor and possesses a higher food value than lean beef, but it is made from milk protein and mineral salts and contains no beef or beef extract. This describes Buffay Sauce, a product developed by S. M. A. Corp., Cleveland. The sauce is used to flavor soups, gravies, broths, meats and even vegetable salads and fish. It may be enjoyed by persons unfortunate enough to be forbidden meat in their diet. Buffay Sauce is put up in 6-oz. and 32-oz. bottles.

SUPPLY-INDUSTRY NEWS

AMERICAN CAN Co., New York, announces the promotion of H. A. BAKER, formerly chief chemist and later sales manager of the central division at Chicago, to vice-president in charge of sales. GORDON KELLOGG and A. H. NUGENT also were advanced, the former being made general manager of sales and the latter succeeding Mr. Baker.

AMERIKA-INTERESSEN, INC., Chrysler Building, New York, was recently organized as the American unit of A. G. Fuer Amerika-Interessen, operating in Berlin, Paris and London, to bring foreign devices, patents and processes to American manufacturers. The organization also negotiates arrangements abroad for American patents.

CANNING MACHINERY & SUPPLIES ASSOCIATION, 553 West Randolph St., Chicago, Ill., will bring its exhibit to canners' doors this year through a combined canning machinery and supplies catalog in which each member will be allotted one page for advertising, at no cost to him.

CINCINNATI MAILING DEVICE Co., 288 Eggleston Ave., Cincinnati, Ohio, manufacturer of cylindrical fiber cans, mailing tubes and cases and paper winding cores, has changed its name to Cin-Made Corp. This was done to connect the company's name more closely with its trademark, Cin-Made. The concern's policy and management will remain the same. Cin-Made is now offering a complete packaging service to packers of all kinds of dry commodities. This service includes development of a container and labels, printing and application of the labels and packaging in a reshipper.

DUNNING PROCESS Co., INC., motion picture producing firm at 932 North La Brea Ave., Hollywood, Calif., is offering its professional service to industries that desire motion pictures of their operations for use in merchandising and publicity work.

IODINE PRODUCTS, INC., 2171 Madison Ave., New York, N. Y., is offering to food and feed manufacturers a combination of iodine with protein which is said to be stable and non-toxic. Used in cattle feeds, it produces an iodized milk.

LEADER INDUSTRIES, INC., Decatur, Ill., announces a complete service to the process industries. This service includes industrial surveys, research, design, equipment manufacture, plant construction and financial planning.

Men, Jobs and Companies

INDUSTRY

BRAZILIAN-AMERICAN COFFEE PROMOTION COMMITTEE, in cooperation with Associated Coffee Industries of America, will direct the expenditure of $1,000,000 in a campaign to increase consumption of Brazilian coffee in this country. The chief aim will be to educate coffee consumers to make a stronger beverage, a recent survey having disclosed the fact that the average consumer makes many more cups of coffee per pound of beans than is commensurate with best quality of beverage.

CANADIAN VEGETABLE OILS, LTD., is sponsoring the construction of a $45,000 initial unit in Vancouver, B. C., for vegetable oil manufacture. The plant will be the first of its kind in Canada. Canadian imports of vegetable oils are valued at $4,000,000 annually.

EASTERN CUBA SUGAR CORP., subsidiary of Cuban Cane Products Co., has been declared bankrupt as a result of action taken by National City Bank at Havana. The court also decreed bankruptcy of Baragua Sugar Co., a subsidiary of Punta Alegre Sugar Corp.

FINDLAY (Ohio) sugar-beet growers have organized with a view of reopening the Findlay sugar plant, which means a disbursement of $1,000,000. O. J. Moorehead was elected president.

H. J. HEINZ CO. plans to produce all its ketchup for export to United Kingdom and the European countries at its Leamington (Ont.) plant. This step is the result of the action taken at Ottawa.

NATIONAL CONFECTIONERS' ASSOCIATION, through its president, Arno E. Sander, is asking the candy industry for funds to finance a fight against increased taxation when Congress convenes this month. "There is no question that our industry must be prepared to wage a campaign in Washington against any increase in our present excise taxes," says Mr. Sander.

PREMIER MALT PRODUCTS CO., Chicago and Peoria, Ill., manufacturer of malt syrup, has acquired Pabst Corp., Milwaukee brewer. The consolidation was effected through an exchange of stock, a new holding company, the Comet Co., being formed to hold the stock of the two companies. Upon legalization of beer, Premier will confine its brewing operations to the Milwaukee plant.

PROCTER & GAMBLE CO., Cincinnati, suffered denunciation of its current advertising of Crisco by National Better Business Bureau. The action was taken on the ground that the advertising "has contained the broad inference that other cooking fats cause indigestion and that users of these other fats invite stomach troubles of various sorts."

SHREVEPORT GRAIN & ELEVATOR CO., Shreveport, La., received an unfavorable decision in an appeal to the Supreme Court of the United States to set aside an indictment charging it with mishandling sacks of meal as to weight. The appeal was based upon the contention that the offense is not defined with certainty in the statutes and that the indictment was in conflict with those articles of the Constitution which separate the government into legislative, executive and judicial branches.

SWIFT CANADIAN CO., LTD., has completed its new $75,000 plant at New Westminster, B. C., and has commenced the production of Jewel brand shortening.

UNITED PRUNE GROWERS OF CALIFORNIA have announced preliminary plans for a three-year advertising program designed to foster byproducts and new uses in the commercial field, to emphasize the food and health value of prunes, and to acquaint the trade with purposes and functions of United Prune Growers.

PERSONNEL

ROWLAND J. CLARK, formerly chief chemist for Schulze Baking Co., is now production manager for the Schulze system, retaining headquarters at Kansas City.

CHARLES P. MCCORMICK

DONALD D. CONN, for five years managing director of California Vineyardists' Association, has resigned to devote his time exclusively to Fruit Industries, Ltd., of which he is managing director. He is succeeded by H. W. WRIGHTSON, Fresno, Calif., secretary of the association.

CHARLES P. MCCORMICK, 36-year-old vice-president of McCormick & Co., Inc., Baltimore, was made president of his company Nov. 12 and was elected president of Mayonnaise Manufacturers' Association at the organization's annual convention. In his advancement in McCormick & Co., Mr. McCormick succeeds his late uncle, Willoughby M. McCormick, under whom he has assumed executive duties for the past five years.

NORVIN PERRY recently resigned from National Biscuit Co., New York, where he had served as production engineer and expert, to establish himself in New York as a production consultant. Bakery appointments made recently by National Biscuit include: R. C. HALE, manager, Atlanta bakery; L. L. MCADAMS, manager, Cambridge bakery; J. H. HADDEN, manager of production, Shredded Wheat Bakeries; and DR. E. T. OAKES, chief chemist, laboratory division.

W. L. RAINEY was recently made chief of the laboratory staff of Commander-Larabee Corp., Minneapolis, to fill a vacancy created by the resignation of Dr. C. G. Harrel. Mr. Rainey has spent ten years in the service of the company.

JOHN W. RATH, of Rath Packing Co., was reelected chairman of the Institute of American Meat Packers at the organization's annual convention in Chicago. W. W. WOODS, of Chicago, was reelected president of the Institute.

ATHERTON RICHARDS was recently made general manager of Hawaiian Pineapple Co., Ltd., Honolulu, and JAMES DRUMMOND DOLE was returned to the office of president. JOHN L. WHITMORE was chosen vice-president and plant manager. These appointments were made in connection with a recent reorganization of the company. The reorganization also provided that additional capital of $1,500,000 be obtained through issuance of 75,000 shares of 6 per cent cumulative convertible preferred stock.

JOHN T. TUCKER, who recently made a trip to Russia in connection with service for Amtorg, has taken a position with G. A. Harvey & Co., London, where he will design and develop exhaust boxes and other canning machinery. Mr. Tucker was formerly with Libby, McNeill & Libby on the West Coast and of late has done some work for C. S. duMont, Ltd., London.

DEATHS

HARRY J. BERRYMAN, manager of Clayoquot Cannery, Tofino, Vancouver Island, B. C., for the past seven years, dropped dead in his office recently. Mr. Berryman was 63. He entered the canning business in 1910.

FREDA EHMANN, founder of Ehmann Olive Co., Oroville, Calif., and referred to as the "mother" of California's ripe olive industry, died Nov. 12, at the age of 93. It was 36 years ago that Mrs. Ehmann began the development of a method for pickling ripe olives.

NORMAN E. GRAY, secretary of International Coffee Co., which he had served for almost 35 years, died recently at his home in Yonkers, N. Y., after an illness of six months. He was 56.

WILLOUGHBY M. MCCORMICK, founder and president of McCormick & Co., Inc., Baltimore, Md., died suddenly Nov. 4, at the age of 68. Mr. McCormick started his long career of accomplishment in the food industry at 25, opening the one-story establishment that developed into the present company. He was very active, organizing Flavoring Extract Manufacturers' Association, Spice Trade Association, American Tea Club and participating in the organization of American Grocery Manufacturers' Association.

ELIE SHEETZ, 84, founder of Martha Washington Candy Co., which developed from one store to a national chain, died Nov. 11 after an illness of four weeks.

THIS MONTH—

DECEMBER

2—National Dairy Association, annual meeting, Palmer House, Chicago, Ill.

5-10—Seventh Annual Exposition of Power and Mechanical Engineering, Grand Central Palace, New York, N. Y.

7-9—American Institute of Chemical Engineers, Hotel Washington, Washington, D. C.

7-9—American Society of Refrigerating Engineers, annual meeting, Hotel New Yorker, New York, N. Y.

7-9—Taylor Society, Inc., Hotel Pennsylvania, New York, N. Y.

28-30—The Society of American Bacteriologists, annual meeting, Michigan Union Building, University of Michigan, Ann Arbor, Mich.

Hors d'Oeuvres

JOIN the milling industry and become a governor. This is, it seems, logical advice, since Clarence D. Martin, president of F. M. Martin Grain & Milling Co., and Henry H. Blood, general manager of Kaysville-Layton Milling Co., were elected governors of Washington and Utah, respectively.

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HERE'S ONE for Ripley—if he can prove it. A man in Baltimore bought a "strictly fresh" egg, on the shell of which was written a name and address. He ate the egg, liked it, then inquired as to the egg's date of birth. Imagine his confusion when he learned it was 1915!

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IF YOU can sell ice for the price of fish, that's economy, and it's a point in favor of glazing cold-storage fish rather than coating them with an edible oil to prevent dehydration. It more than pays the extra handling costs, according to a scientific bulletin from Prince Rupert, B. C.

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"STAR SPANGLED" boloney—a hint for tin-pan alley—is now a possibility. Sausage casings can be cast in red, white and blue or any other color combination. And hot dogs and boloney can be dressed for the opera, the hunt, or what have you!

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THE NATION is about to be made pineapple-minded, and we're not speaking of fresh pineapples. The process won't involve changing the insides of gourds to pineapples, but the trick will be done by a million dollars' worth of advertising. Pineapple Producers' Cooperative Association, Ltd., launched a comprehensive campaign Nov. 19.

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A GERMAN'S view of America's going wet is expressed by a caricature of the Statue of Liberty with a cocktail glass in the upraised hand and a beer bottle in the other. And, speaking of beer, the Institute of Fermentation has reopened with 19 students in Chicago, and Kroger is considering the sale of bottled beer in its stores.

What Food Men Are D

Committee Spurs Industry—Britis Forn
Brewers Prepare—Small Loans Avai
Retailers—Grade Label —M

MANY large manufacturers, both in and out of the food industry, are being stirred from their depression lethargy by the Committee of Industrial Rehabilitation, headed by A. W. Robertson, chairman of Westinghouse Electric & Manufacturing Co. By visiting manufacturers and urging them to survey their plants from the standpoint of modernization, members of this committee, working in the twelve Federal Reserve districts, have aroused industrialists to doing everything from building new plants and installing new machinery to remodeling retail establishments.

Tangible proof of the effective work of the committee is seen in specific commitments reported by regional committees as follows: Fourth Federal Reserve District, expenditures planned and completed, $8,053,600; Ninth district, expenditures planned, $2,115,000; Twelfth district, $9,882,000. Of these total expenditures, nine food and container industries account for $1,708,900 in the Fourth Federal Reserve District, and two for $400,000 to $500,000 in the Twelfth district.

AMERICAN food interests suffer no immediate threat in Britian's establishment of "Empire Farmers' Co-op., Ltd.," in the opinion of government specialists. They know it takes years for any cooperative to become effective. More than that, success has been confined to local cooperatives with very simple and definite objectives. The super co-operative quickly gets into complications.

The objectives of the ambitious far-flung "Empire Farmers' Co-op." are to control production of foodstuffs throughout the empire as far as possible; supply a sure market at prices 20 to 25 per cent above the present level; sell to consumers at the cost of production, plus working costs; and replace foreign food products with empire products.

FIVE YEARS AGO, transcontinental railroads requested permission to reduce the carload rate on canned foods from the Pacific coast from $1.05 to 90 cents per 100 lb. The Interstate Commerce Commission thought this was lower than necessary to meet the competition of the Panama Canal steamship lines and authorized a rate of 98 cents. The railroads spurned this reduction as too small to attract sufficient traffic to offset the loss in revenue on traffic that probably would move anyhow. At that time, the railroads still claimed half the total tonnage of 706,000. When they renewed their plea last spring, they had left only 36 per cent of a 630,000-ton total. The Commission now is doubtful whether the roads can recover the 66,000 tons of lost traffic necessary to offset the rate reduction, but it authorized the 90-cent rate, effective Nov. 25.

BREWERS are out to get their cut of the odd four and one-half billion dollars spent annually on liquor in the United States. Anticipating legalization of beer in the short session of Congress, or in the regular session at the latest, they are making plans for future production and are ordering equipment to modernize or enlarge their plants.

In Milwaukee, Blatz Brewing Co. is spending $2,000,000 for modernization; Miller Brewing Co., $1,000,000; and Pabst Corp., $2,000,000. Cream City Brewing Co. will invest $100,000 to $150,000; George J. Meyer Manufacturing Co., at Cudahy, $300,000. Jacob Ruppert, famous New York brewer, will spend $5,000,000 for improvements and additions within a reasonably short time after beer becomes legal. Cincinnati reports pending expenditures of at least $2,000,000. Breweries in other cities plan similar modernization.

MANUFACTURERS too small to obtain loans from the Reconstruction Finance Corp. or from the Robertson committee now have an agency to which they may turn for finances. Improved Industries Corp., 521 Fifth Ave., New York, has been organized to finance, without notes, the purchase and installation of equipment needed by industrial plants to carry out modernization programs. Only those projects approved by the concern's engineering department will be financed. No loans will be made for expansion programs or new projects, funds being available only for improving existing plants.

FOOD MEN attending the annual convention of Associated Grocery Manufacturers of America held in New York, Nov. 2-3, sat with ears perked up as guest speakers from the retail and wholesale field told them what they thought about manufacturers' policies and practices. Among other things, the manufacturers were told that chain stores are in a position to sell their private brands in competition with nationally advertised goods, and that they will do so when they aren't able to make a fair profit on the latter. They were also told that the chain, the voluntary chain and the retailer-owned wholesaler are now in a position to be independent and that manufacturers who fail to deal fairly with them will be cutting their own throats. This information was given as facts, not as threats.

The spirit of cooperation exhibited between manufacturers and distributors in handling mutual problems is conceded to

Doing and Saying

Form Co-op.—Freight Rates Cut—Available—A.G.M.A. Hears —Mayonnaise Meeting

be a healthy development. Proof of that is seen in the report that in September the large retail groups were devoting twice as much advertising to manufacturers' as to private brands. This is attributed to the fact that 85 per cent of the manufacturers had put forth a definite effort to improve distributors' profits.

"READ the label" is to have a new meaning for housewives. A number of manufacturers of canned vegetables are planning to show the quality of their products on the label, according to the Department of Agriculture. The quality will be stated in terms of the following government grade standards: Grade A (fancy); Grade B (extra standard or choice); and Grade C (standard). Sub-standard products, of course, are labeled in accordance with government provisions.

The Bureau of Agricultural Economics also has made it possible, to a limited extent, for canners to prefix "U.S." to the grade designation. Products so labeled must be canned under supervision of a government grader, who must subsequently grade representative samples, allowing time for defects to become apparent.

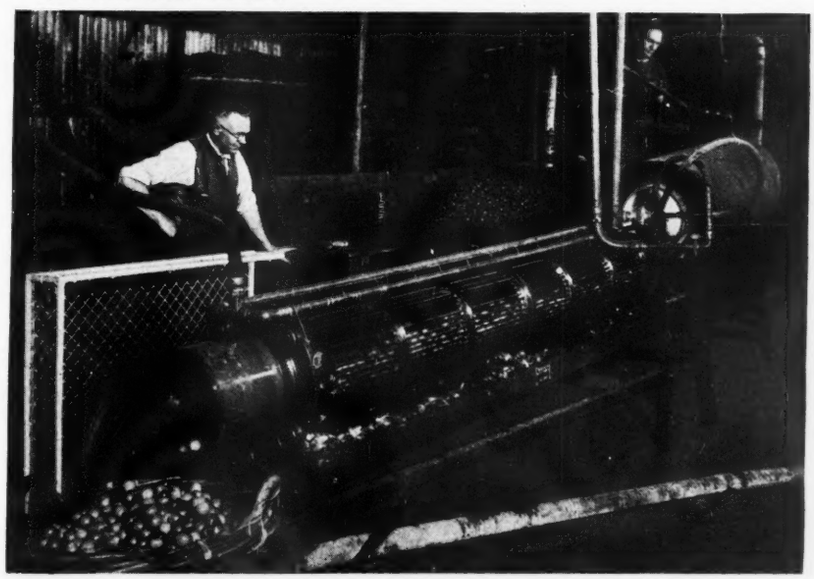
CLIMAXING the proceedings at the seventh annual convention of the Mayonnaise Manufacturers' Association, held in Boston, Oct. 24-26, was the announcement that Best Foods, Inc., and Kraft-Phenix Cheese Corp. had underwritten a $20,000 budget for the coming year. With these funds, the association will emphasize merchandising under the direction of an association sales manager and make a drive for new members, the research fellowship work having been suspended indefinitely.

As part of the merchandising activities, a publicity campaign will be carried out to educate consumers to the difference between mayonnaise and salad dressings. An aid to the membership drive is seen in the muzzling of "big interest" members, which is expected to encourage small manufacturers to become active in the association.

GREAT BRITAIN crippled one of the competitors for her markets Nov. 9, by increasing the duty on imports of all live animals from the Irish Free State from 20 to 40 per cent and that on eggs, cream, butter and meat from 20 to 30 per cent, ad valorem. Duties on these products were originally imposed on July 15 to recover sums claimed to be due in land annuity payments.

In keeping with the action at Ottawa, the Federated Malay States increased the import duty on sugar from 3 to 5 cents a pound and imposed duties of 8 cents and $5 a pound, respectively on tea and saccharine. The preferential tariff on sugar is 3 cents; that on tea, 6 cents.

On the other side of the world, onions are being peeled by fire. With this machine, developed by Australian Pickle Co., Sydney, onions are subjected to a fierce gas flame for 3 seconds as they roll down an incline, burning off the skins. It is stated that a ton yields 400 lb. more than when peeled by hand. (Courtesy *Industrial Gas.*)



—AND THE NEXT

JANUARY

15—American Engineering Council, annual meeting, Washington Hotel, Washington, D. C.

16-18—Institute of American Poultry Industries, annual meeting, Medinah Athletic Club, Chicago, Ill.

23-24—National Preservers' Association, annual meeting, Congress Hotel and Annex, Chicago, Ill.

23-27—National Canners' Association, annual meeting, Hotel Stevens, Chicago, Ill.

23-27—National Food Brokers' Association, annual meeting, Hotel Stevens, Chicago, Ill.

——National Pickle Packers' Association, annual meeting, Palmer House, Chicago, Ill.; date not set but will be during canners' convention.

Concentrates

A modern rabbit freezing plant with a capacity of 6,000 rabbits daily has been built near Sydney, Australia . . . Citron Growers' Association has begun canning grapefruit for commercial purposes at Kingston, Jamaica . . . Dugan Bros., bakers operating delivery vehicles in New York State, recently won a supreme court decision against "prohibitive" pedler's license fees . . . Trends in butter prices over a period of years would seem to indicate that they reflect general business conditions more quickly than most indicators . . . Promising outlets for lactose, or milk sugar, have been found in the manufacture of explosives and certain types of confectionery . . . Commercially produced burbot-liver oils have been shown to be from four to ten times as potent in vitamin A and from three to four times as potent in vitamin D as medicinal cod-liver oil . . . By the use of various acids, the oyster muscle can be caused to relax sufficiently to make the valves gap wide, and these acids also inhibit bacterial growth . . . By presidential decree, Brazil is to abstain from coffee-planting for three years . . . Tea imports from India into the United States continue to gain, increasing 11 per cent for the three months ending Sept. 30, as compared to the same period of 1931 . . . Austria apparently will have to import approximately 8,083,000 bu. of wheat during the twelve months ending Aug. 31, 1933 . . . Four-hole, double-size ice cream cabinets using solid CO_2 may be operated for a year at a total cost of approximately $140, according to John L. Lenker, Borden Co. . . . Ten years ago there were only about 200 industrial research laboratories in the country, but today there are some 1,700, a goodly part of them in the food industries, according to Lewis W. Waters, General Foods Corp. . . . A farm population of 32,000,000 for the United States is officially predicted for the end of 1932, the record being 32,077,000 in January, 1910 . . . During the season ended Oct. 31, approximately 143,000 carloads of citrous fruit from all sources was sold in the American market, a volume exceeded only in 1929 and 1931 . . . Total wheat stocks held by mills on Sept. 30 were 154,036,986 bu., as compared to 139,001,879 bu. a year ago.

BUSINESS TRENDS

Two Food Industries Show Gains; Five Less Active, Census Indicates

Of seven food industries whose 1931 censuses of manufactures were reported during the past month by the Department of Commerce, all but two showed decreases in activity from 1929, judging by the number of wage earners employed. An increase in the number of employees was reported for manufacturers of shortenings (other than lard), vegetable cooking oils and salad oils, and for producers of sausage and sausage casings. In the shortening industry, 23 per cent more wage earners were employed, and the amount paid for wages was 18.4 per cent higher. There were 49 establishments, as compared to 40 in 1929, but the value of their products was less by 26 per cent. For the sausage industry, increases of 6.6 per cent and 3.7 per cent, respectively, were shown for number of establishments and number of wage earners, but 7.1 per cent less wages were paid. The total value of products was down 24.0 per cent.

The census of the confectionery industry indicated the following percentage decreases: number of establishments, 23.1; number of wage earners, 19.9; wages, 26.1; total value of products, 28.3. Ice cream manufacturing, likewise, experienced decreases in all departments reported, the percentage declines being: number of establishments, 7.6; number of wage earners, 20.8; wages, 25.1; total value of products, 18.5.

Decreases were reported also for the other industries considered. Biscuit and cracker manufacturing establishments decreased in number from 375 to 351 and they employed 15.8 per cent fewer wage earners, who were paid 21.0 per cent less wages. The value of biscuit and cracker products declined 22.9 per cent. Plants engaged in roasting and grinding coffee and spices were 4.8 per cent fewer in 1929 than two years previous, and the number of workers in the industry declined 5.7 per cent. The amount paid workers dropped 10.1 per cent and total value of products was 37.1 per cent less. In the grease and tallow industries, the percentage declines were reported as follows: number of establishments, 19.9; number of wage earners, 25.7; wages, 33.5; total value of products, 52.5.

Recent Tax Rulings

After reconsidering an earlier ruling, the Treasury Department has decided that a manufacturer of a carbonated beverage may take credit against the tax paid on the beverage to the amount of the tax levied on the carbonic acid gas used in its manufacture. It is also held that the manufacturer may purchase carbonic acid gas free of tax. Other decisions stipulate that frozen suckers and flavored milk drinks are tax-free.

BASIS FOR THE CURVES

Retail food prices, factory employment, factory payrolls and wholesale prices are based on indexes of the Department of Labor. Cost-of-living index is that of the National Industrial Conference Board. Electrical power consumption figures are furnished by *Electrical World*.

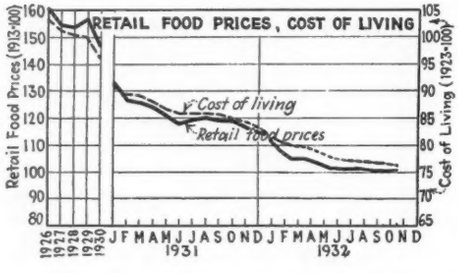
Butter Prices Rise

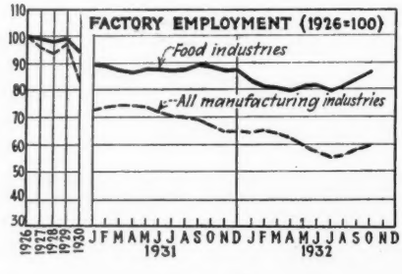
Attention is now focused on the steady rise in butter prices of the past month. Last June a continued rise in hog prices preceded a general upturn in business conditions which continued to gain in momentum until the uncertainties of the approaching election set up an interference. With the election over, business seems to be groping for a tangible favorable factor upon which to base a renewed upward trend.

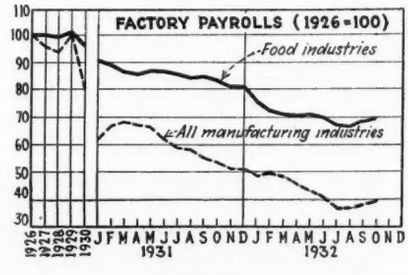
After holding near 55 per cent of normal for two consecutive months, *The Business Week* Index of business activity slumped to 51.8 per cent of normal for the week ending Nov. 19.

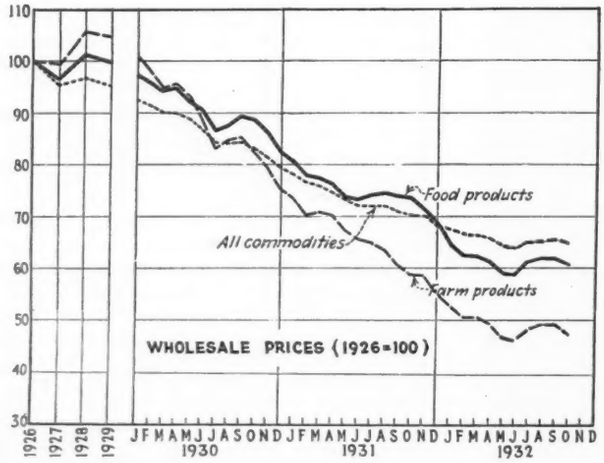
For the week ending Nov. 19, wholesale prices of all commodities and of food, as reported by the U. S. Department of Labor, showed a slight upturn. However, all commodity prices were 0.31 per cent below those of Oct. 15; food prices were 0.99 per cent higher than on Oct. 15. A weighted index also showed a stiffening in prices of all commodities and of food for the week ending Nov. 12, followed by a decrease for the two weeks ending Nov. 26. Net decreases for the five weeks ending Nov. 26 were 1.71 and 3.72, respectively.

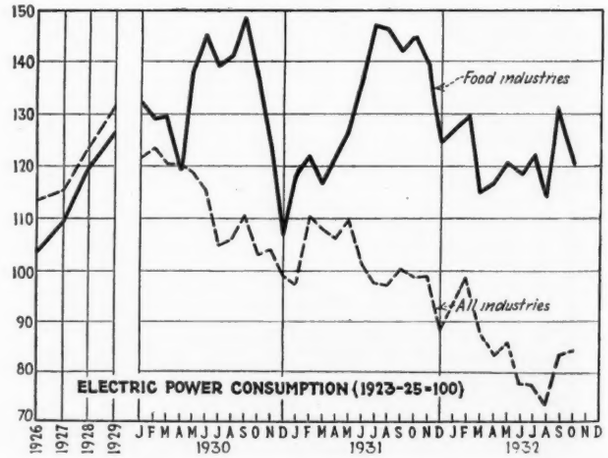
Cooler weather and aggressive merchandising increased A. & P. October tonnage sales 6 per cent over those of September. Its volume of sales for October, 1932, was 1.13 per cent less than for October, 1931.


RETAIL FOOD PRICES, COST OF LIVING
Retail Food Prices (1913=100)
Cost of Living (1923=100)
Cost of living
Retail food prices
1926 1927 1928 1929 1930
J F M A M J J A S O N D J F M A M J J A S O N D
1931
1932


FACTORY EMPLOYMENT (1926=100)
Food industries
All manufacturing industries
1926 1927 1928 1929 1930
J F M A M J J A S O N D J F M A M J J A S O N D
1931
1932


FACTORY PAYROLLS (1926=100)
Food industries
All manufacturing industries
1926 1927 1928 1929 1930
J F M A M J J A S O N D J F M A M J J A S O N D
1931
1932


WHOLESALE PRICES (1926=100)
Food products
All commodities
Farm products
1926 1927 1928 1929
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1930
1931
1932


ELECTRIC POWER CONSUMPTION (1923-25=100)
Food industries
All industries
1926 1927 1928 1929
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1930
1931
1932

CONSTRUCTION NEWS

	Proposed Construction Pending	Contracts Awarded Awarded November	Contracts Awarded Cumulative 1932 No. Awards	Contracts Awarded Cumulative 1932 Total
Bakery Products	$313,000	$64,000	29	$3,021,000
Beverage	9,540,000	.....	9	502,000
Canning and Preserving	115,000	.....	17	759,000
Confectionery	40,000	.....	1	30,000
Grain Mill Products	293,000	30,000	26	5,185,000
Ice, Manufactured	270,000	.....	37	1,751,000
Meats and Meat Products	109,000	56,000	32	2,099,000
Milk Products	133,000	65,000	43	3,704,000
Sugar	.....	.....	1	40,000
Miscellaneous	420,000	130,000	30	2,719,000
Total	$11,233,000	$345,000	225	$19,810,000

PROPOSED WORK BIDS ASKED

Abattoir—George Roich, c/o N. McLaughlin, 410 38th St, Union City, N. J., plans the construction of an abattoir at Bway and 49th St., Union City. Estimated cost $40,000.

Bakery—Brownel Realty Co., 267 South 4th St., Brooklyn, N. Y., plans the construction of a bakery and storage building at 99th Ave. and 222d Sts., Queens Village, N. Y. Estimated cost $30,000. H. Holder, 242 Franklin Ave., Brooklyn, N. Y., is architect.

Bakery—Anthony DeLucca, 743 East 187th St., New York, N. Y., plans the construction of a 2 story, 21x50 ft. bakery at 187th St. and Prospect Ave. Estimated cost with equipment $28,000. John F. Nolan, 343 East 123rd St., New York, is architect.

Bakery—Gordon Baking Co., 4225 21st St., Long Island City, N. Y., plans the construction of a 1-, 2-, and 4 story, 180x244 ft. bakery at 42-28 22nd St., Long Island City. Estimated cost $50,000. Van Wart & Wein, 347 Madison Ave., New York, N. Y., are architects.

Bakery—Grippo Cone & Pretzel Co., 324 West Court St., Cincinnati, Ohio, plans to alter and repair its plant recently damaged by fire. Estimated cost $45,000.

Bakery—Holzbauers Bakery, Bordentown, N. J., is having preliminary plans prepared for 1 story bakery. Estimated cost $40,000. The McCornick Co., Inc., 250 Park Ave., New York, N. Y., is architect.

Bakery—Independent Bakery Co., Duryea, Pa., plans the construction of a bakery here. Estimated cost $30,000.

Bakery—Vance Bros. Baking Co., 9th Ave. and Van Beuren St., Phoenix, Ariz., plans the construction of a bakery to have a capacity of 10,000 loaves at Tucson, Ariz. Estimated cost $50,000.

Brewery—Blatz Val Brewing Co., E. Landsberg, Pres., 604 Bway., Wilwaukee, Wis., is receiving bids for altering its brewery and installing new equipment. Estimated cost $1,500,000.

Brewery—Peter Doelger Brewing Co., 84 Forrest St., Brooklyn, N. Y., plans the construction of a new brewery. Location not yet decided.

Brewery—Cream City Brewing Co., 492 15th St., Milwaukee, Wis., plans to alter and install new equipment in its plant. Estimated cost $100,000.

Brewery—Lackman Brewing Co., 4365 Carnation Pl., Cincinnati, Ohio, is having plans prepared by Carl J. Kiefer, Engr., Schmidt Bldg., Cincinnati, for brewery on Southside Ave. Estimated cost $250,000.

Brewery—Miller Brewing Co., W. C. Kraft, Mgr., 4002 State St., Milwaukee, Wis., plans to alter and install new equipment in the brewery. Estimated cost. $1,000,000.

Brewery—Pilsener Ice, Fuel & Beverage Co., Charles J. Chovjah, Mgr., West 65th St. and Clark Ave., Cleveland, O., contemplates the construction of an addition to its brewery to include bottling plant. Estimated cost $75,000.

Brewery—Charles Proebstle, c/o City Inc Co., Missouri Ave., Atlantic City, N. J., is interested in a corporation being formed to convert the ice plant at Missouri and Arctic Aves., into a brewery. Estimated cost $250,000.

Brewery — Rosebud Ice Co., Louis Kuebler, Pres., Fremont, O., contemplates the construction of a brewery. Estimated cost with equipment $75,000. Maturity indefinite.

Brewery—Jacob Ruppert Brewery, Col. Jacob Ruppert in charge, 1639 3rd Ave., New York, N. Y., plans the construction of a brewery. Estimated cost including equipment $5,000,000. Maturity indefinite.

Brewery—Syndicate, c/o Paul Gerhardt, Archt., 64 West Randolph St., Chicago, Ill., will soon receive bids for a brewery at East 74th St. and Illinois Central R.R. tracks. Estimated cost including equipment $1,000,000.

Brewery—Wehle Brewing Co., Campbell Ave., West Haven, Conn., is having plans prepared by Brown & Van Beren, Archts., 185 Church St., New Haven, Conn., for 1 story, 40 x 100 ft. brewery, to include bottling plant. Estimated cost $40,000.

Candy Factory — Westfield Candy Kitchen, Inc., 171 East Broad St., Westfield, N. J., is having preliminary plans prepared by Walter Snyder, Archt., 790 Broad St., Newark, N. J., for candy factory. Estimated cost $40,000.

Canning Factory—Burnham & Morrill Co., G. B. Morrill, Pres., 45 Water St., Portland, Me., plans the construction of a corn canning factory at Fryeburg, Me.

Canning Plant—C. S. Craig Co., Streator, Ill., contemplates the construction of a canning plant here. Estimated cost with equipment to exceed $45,000.

Cooking Fat Compounds — Lookout Oil & Refining Co., Kirkland Ave., Chattanooga, Tenn., plans the construction of a factory for the manufacture of cooking fat compounds. Estimated cost $200,000.

Creamery—Mountain Valley Products Co., H. C. Watson, Pres. and Genl. Mgr., Alturas, Calif., is having plans prepared for 1 story, 48x58 ft. creamery at Cedarville, Calif., to include three cold storage rooms, storage and can room, cooling tank and pasteurizing room. Estimated cost $15,000.

Dairy—Frick Bros., c/o Daniel A. Hopper, Archt., 22 Ridgewood Ave., Irvington, N. J., are receiving bids for 1 story, 40x360 ft. dairy plant. Estimated cost $40,000.

Milk Depot—Theodore Luce, 533 West 57th St., New York, N. Y., is having plans prepared by F. S. Parker, Archt., 119 West 57th St., for milk depot and pasteurizing plant. Estimated cost $28,000.

Ice Cream Plant—Evans Milk Co., 1400 Northeastern Ave., Oklahoma City, Okla., is having plans prepared for 2 story, 85x150 ft. plant for the manufacture of ice cream. Shumarker & Winkler, First National Bank Bldg., Oklahoma City, are architects. Estimated cost $50,000.

Food Products Plant—Otta Seidner, Inc., Friendship St., Westerly, R. I., plans the construction of a plant for the manufacture of food products, including mayonnaise. Estimated cost $40,000.

Food Products Plant — Vegetable Products Co., Wilmington, Calif., contemplates the construction of a food products plant here. Estimated cost $40,000.

Flour Mill—William Ackerson, Sandy Lake, Pa., plans the construction of a flour mill to be leased to the Sandy Lake Flour Mills. Estimated cost to exceed $50,000.

Flour Mill—Steger Flour Milling Co., Bonham, Tex., plans the construction of a flour mill. Estimated cost $50,000.

Grain Elevator—Terre Haute Terminal Grain Corp., Terre Haute, Ind., plans to alter and repair its grain elevator recently damaged by fire. Maturity indefinite. Estimated cost $40,000.

Grain Elevator—Triangle Milling Co., Portland, Ore., plans the construction of a grain elevator and storage building. Estimated cost to exceed $28,000. Ernest Kroner, 556 East Pine St., Portland, is architect.

Milling Plant—Mt. Vernon Mill Co., Mt. Vernon, Ind., plans the construction of a corn and grain milling plant. Estimated cost $125,000.

Extracting Mill—Canadian Vegetable Oils, Ltd., C. F. Miller, Pres., 37 Imperial Oil Bldg., Vancouver, B. C., plans the construction of a 65x145 ft. extracting mill. Estimated cost $25,000.

Packing Plant—Albro Packing Co., Springboro, Pa., plans to repair its packing plant recently damaged by fire. Estimated cost $20,000.

Packing Plant—Coast Packing Co., Huntington Park, Calif., is having plans prepared by J. C. Barr, Engr., 2069 Randolph St., Huntington Park, for an addition to its packing plant to include 73x94 ft. cooler and freezer rooms.

Packing Plant—Young Provision Co., Carl F. Young, Pres.-Treas., 212 East South St., Wooster, Ohio, plans the construction of a 1 story, 95x132 ft. packing plant. Anders & Reimers, Schofield Bldg., Cleveland, Archts. and Engrs.

Sausage Factory—Grote & Wiegel, 73 Spruce St., Hartford, Conn., plan to construct an addition to factory on Spruce St. Estimated cost $40,000.

Refrigerator Plant—M. C. Provision Co., 414 Hoboken Ave., Jersey City, N. J., plans to alter its refrigerator plant. Estimated cost $28,500. Construction Service Corp., 80 Broad St., Elizabeth, N. J., is architect.

Cold Storage Plant—Consolidated Ice & Cold Storage Co., Anaheim, Calif., plans to rebuild its cold storage plant recently destroyed by fire with a loss of $130,000.

Cold Storage Plant—S. J. Miller, 101 North Vine St., Marshfield, Wis., plans the construction of a 1 story, 60 x 150 ft. cold storage plant.

Ice Manufacturing Plant—Independent Ice Co., 30 Charles St., Worcester, Mass., plans to construct an addition to its plant at Madison and Gold Sts., Worcester. Estimated cost to exceed $40,000.

Ice Plant—George W. Moore, c/o Riveria Fish Co., Riveria, Fla., is chairman of a cooperative company being formed by seven fish companies to construct an ice plant at West Palm Beach, Fla. Estimated cost $60,000.

Market Building—F. H. Morgan, et al, c/o W. H. Weeks, Archt., 525 Market St., San Francisco, Calif., is having plans prepared for a 1 story market building on Franklin St., Oakland, Calif., to house 30 food concessions. Estimated cost $115,000.

CONTRACTS AWARDED

Bakery—R. Cannizzario & A. Feranciello, 75 Cross St., Paterson, N. J., awarded contract for 2 story bakery at Mill and Grand Sts., to Charles Cona Building Co., 78 Zabriskie St., Haledon, N. J. Estimated cost $35,000.

Bakery—G. Jesule, 39 Walker St., Fairview, N. J., will build bakery at Walker and 5th Sts. by day labor. George Willaredt, 411 22nd St., West New York, N. J., is architect. Estimated cost $28,500.

Creamery—H. J. Boyle, West Jefferson and Avalon Sts., Los Angeles, Calif., will build a 2 story creamery and 150 x 196 ft. garage. Estimated cost $65,000. Work will be done by day labor under supervision of C. Whittlesey. Archt., 1616 South Vermont Ave., Los Angeles.

Mill—Sunnyside Milling Co., Evansville, Ind., awarded contract for mill on West Ohio St. to M. J. Hoffman Construction Co., Evansville. Estimated cost $30,000.

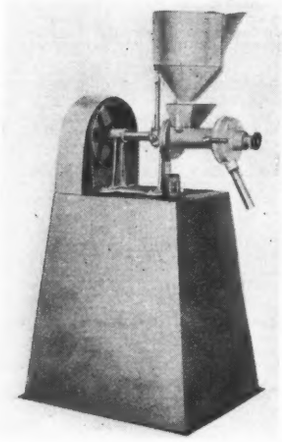
Packing Plant—South Omaha Packing Co., 4734 South 27th St., Omaha, Neb., awarded contract for 1 story addition to packing plant to Cooper Construction Co., 4610 Douglas St., Omaha, Neb. Estimated cost $28,000.

Packing Plant—Trunz Pork Stores, Inc., Lombard St. and Kingsland Ave., Brooklyn, N. Y., awarded contract for altering packing plant to Kay Construction Co., 130 Flatbush Ave., Brooklyn, N. Y. Estimated cost with equipment $28,000.

Warehouse—Associated Grocers, Inc., 809 East 23rd St., Kansas City, Mo., awarded contract for 2 story, 125x142 ft. warehouse to John H. Thompson, 114 West 10th St., Kansas City. Estimated cost $100,000.

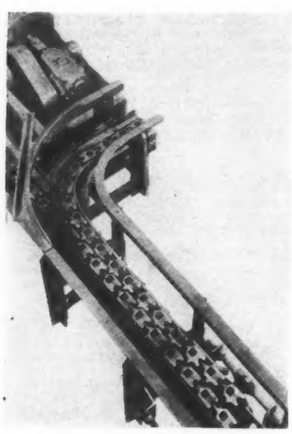
Warehouse—Yewell Tea Co., Barrington, Ill., awarded contract for remodeling warehouse to Ralph Renwick, 540 North Michigan Ave., Chicago, Ill. Estimated cost $30,000.

NEW EQUIPMENT FOR



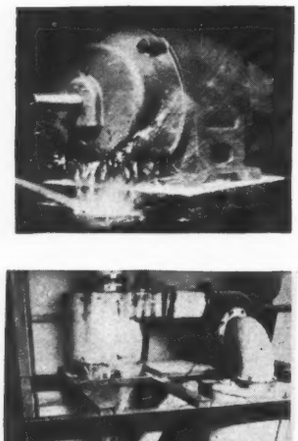
Triple-Plate Peanut-Butter Mill

Comparatively little oil separation takes place in peanuts ground by the triple-plate peanut-butter mill perfected by Pirtle Engineering Co., Inc., 2727 Mary St., Chicago, Ill., it is asserted. This is due to light pressure in the grinding head, which reduces the amount of heat generated. The end thrust in the grinder is less than half that in the old mill, because the machine feeds material to the grinding surfaces slightly faster than the worm feed delivers it. This machine is made without a clutch. It has a capacity of 2,500 lb. per 8-hour day.



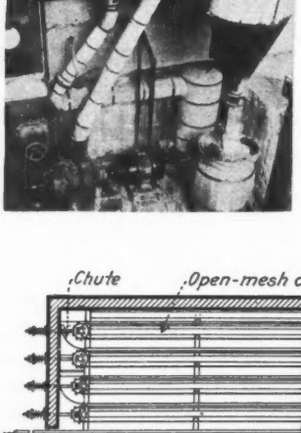
Side-Drive Conveyor

Power units and driving sprockets are eliminated with a side-drive conveyor chain announced by Lathrop-Paulson Co., 2459 West 48th St., Chicago, Ill. With this unit, a main conveyor propelled by only one power unit can have several branch lines. Power is transferred to the branch-line chain by lugs which engage shoulders on the links of the main chain.



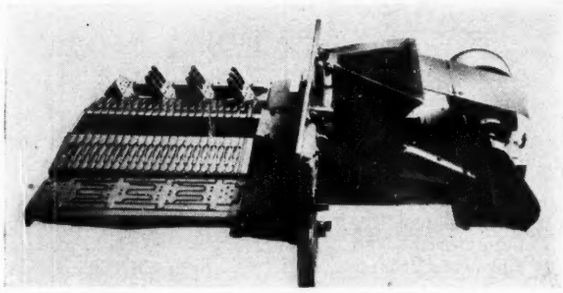
Splashproof Motor

Water splashed under pressure from any angle will not enter the splashproof motor recently put on the market by Louis Allis Co., Milwaukee, Wis., according to the manufacturer. Double baffles in the elliptical-shaped air passages of the end bells provide protection. This construction, while permitting free passage of ventilating air, traps and drains water splashed into the openings. A shaft guard breaks the force of a stream directed along the shaft extension and prevents water from entering the bearing chamber.



System Pulverizes, Dries and Separates

Materials may be ground to a fine, dry, powdered concentrate in the kiln mill of Raymond Bros. Impact Pulverizer Co., 1315 North Branch St., Chicago, Ill., when the mill is operated in conjunction with the company's air-separating and air-conveying equipment. In this set-up, hot air is introduced into the grinding chamber to remove the moisture. The material is then conveyed by air to a separating unit. This comprises a double-cone vacuum air separator which classifies materials to a fine powder, an exhaust fan which produces the required volume of circulating air, and a cyclone collector which removes the fines. The illustration shows a typical pulverizing and dehydrating installation.



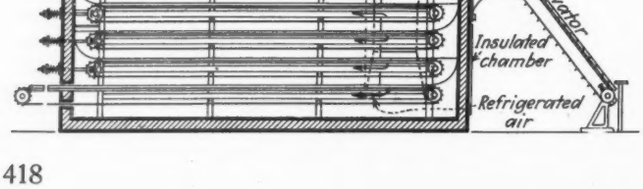
Improved Screw Cap For Bottles

Dressy appearance, easy removal and tight sealing are provided in a screw cap for bottles announced by Anchor Cap & Closure Corp., 22 Queens St., Long Island City, N. Y. The improved sealing efficiency is attributed to the use of a resilient tin plate; to a deep thread of uniform pitch and of a length that provides contact of from 290 to 350 deg. with the glass thread; to a reduced height of knurling with a slight space above it, and to the use of an inverted bead. The latter adds to the attractiveness of the cap and provides a wide panel for decorative purposes. It also concentrates sealing pressure at a point directly above a glass finish.

System Freezes With Compressed Air

Low-temperature compressed air is impinged upon a product to accomplish freezing and hardening with refrigerating apparatus designed by Equity Construction Co., Inc., 25 West 43d St., New York, N. Y. Although intended for use particularly with packaged goods, the equipment is suitable for use with material to be refrigerated in molds. It comprises, essentially, an insulated tunnel with a series of endless conveyors, one below the other, an elevating mechanism for raising the packages to the top conveyor, and an arrangement of ducts for directing the air against the packages, both from above and from below. The conveyor belts are open-mesh to permit passage of air, and at the discharge end of each conveyor is a chute which directs the packages to the receiving end of the one below. The conveyor system may be connected to filling, depositing or packaging machines to effect continuous, straight-line production.

Ice cream packed in 2-oz. paper cups and entering the refrigerating chamber at from 25 to 28 deg. F. can be reduced to a temperature of 8 deg. F. in about 50 minutes, with the air entering the chamber at a temperature of 30 deg. F.



Small Stoker Of Underfeed Type

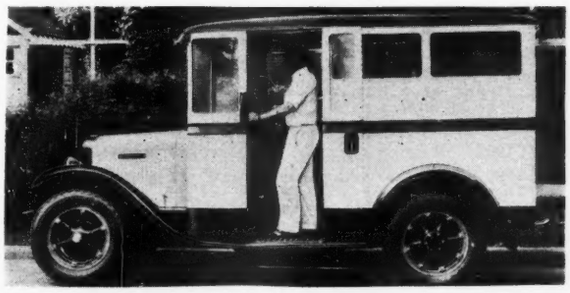
Boilers developing from 40 to 150 hp. may be mechanically fired by an underfeed stoker recently put on the market by Combustion Engineering Corp., 200 Madison Ave., New York, N. Y. The fuel-feeding mechanism is of the plunger type and comprises a main and auxiliary pushers, all mounted on a sliding plate which moves back and forth in the bottom of the retort. The grate surface is composed of stationary bars with moving elements or tuyeres which agitate the fuel bed and make for effective air distribution. While dead plates on either side of the active grate surface are standard equipment, shaking dump grates of the sectional type are optional. A constant-speed motor drives the stoker, and variation in fuel supply is obtained by a timing device that regulates the number of plunger strokes per minute and gives an 8-to-1 speed range.

Long-Life Armor For Recorder Tubes

Resistance to bending, high tensile strength and imperviousness to moisture are characteristics said to be incorporated in the design of a new rubber-covered armor for the capillary tubes of dairy recorders made by Consolidated Ashcroft Hancock Co., Inc., Bridgeport, Conn. The manufacturer's tests showed that the best all-metal armors withstood only 485,000 bendings, as compared to 1,500,000 bendings without fracture for the rubber-covered armor. This new armor is constructed of a steel spiral covered with a fabric braid over which is placed a coating of rubber.

Hand Filler For Wide-Mouth Jars

Ten or more containers may be filled per minute with semi-solid and semi-liquid products by the hand-operated model L filler made by Mojonnier Bros., Chicago, Ill. This machine is suitable for filling all standard sizes of cups and wide-mouthed jars. Filling is accomplished by the movement of a lever. With one stroke, the filling piston forces up to one pint of the product into the container. By operating the lever twice, containers having a capacity of from one to two pints may be filled. Floor space of 3x4 ft. is required for the filler. The unit weighs 320 lb.



Door-to-Door Delivery Truck

A truck designed for door-to-door delivery and equipped with an automatic clutch and a self-locking brake pedal is announced by International Harvester Co., 606 South Michigan Ave., Chicago, Ill. The driver's compartment of the vehicle is unusually large, being 25⅝x59⅝ in., and easy access to the compartment is provided by a door 25¾ in. wide. The front doors "jack-knife" and fold against the outside of the body toward the rear. The engine is the 4-cylinder, L-head type, and develops 39 hp. at 2,400 r.p.m. The generator is a low-speed, high-charging unit, commensurate with door-to-door operation. A turning radius of only 22 ft. to the left and 21 ft. 3 in. to the right makes for flexible handling. A 42-case milk delivery body is made for this vehicle.

THE MANUFACTURERS OFFER

Chemicals—The prices of important chemicals used in industry are listed in the 30-page, pocket-size booklet by Roessler & Hasslacher Chemical Co., Inc., Empire State Bldg., New York, N. Y.

Stokers — Detroit LoStokers are described from the construction, operation and efficiency point of view in a 16-page booklet by Detroit Stoker Co., General Motors Bldg., Detroit, Mich. The publication includes halftones of ten typical applications of the stoker and capacity and efficiency tables.

Hard Rubber—In an 18-page, fully illustrated booklet, American Hard Rubber Co., 11 Mercer St., New York, N. Y., points out the industrial value of hard rubber, gives its physical, chemical and electrical properties, and tabulates the standard grades, weights and tolerances of hard-rubber rods, sheets and tubes. The approved shop practice for working hard rubber is described.

Industrial Lighting Equipment — A 64-page, well-illustrated catalog of Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., describes a host of industrial lighting units and lists them in a convenient manner. Lamp sizes, reflector dimensions and prices are given.

Labels—Eveready Label Corp., 257 West 17th St., New York, N. Y., offers a 48-page "Hand-Y-Book of Labels" with color illustrations. Information on labels for every purpose is included, with sizes and prices.

Blowers and Compressors—In a 32-page booklet with an abundance of illustrations, Elliott Co., 506 Morris Bldg., Philadelphia, Pa., discusses its Type M and Type S centrifugal blowers and compressors from the standpoint of applications, advantages and principles of construction. Performance curves and technical data are included. A second booklet of 20 pages covers Type O units.

Cereal Chemistry — American Society of Bakery Engineers has published a 6-page bulletin containing answers to technical baking questions. The subjects treated include the value of starch content, gluten content and enzyme action of flour, the influence of shortening and of sugar in dough and the effect of cinnamon on fermentation. Address Victor E. Marx, 1541 Birchwood Ave., Chicago, Ill.

Advertising — Important information on the effectiveness of different advertising media is contained in a 16-page booklet entitled "Sales-Spot Advertising," published by United States Printing & Lithograph Co., Robertson Ave. and Beech St., Cincinnati, Ohio. Of particular interest are the sections "What 57 Cents Buys in Potential Sales Impressions" and "Retail Trade in the United States."

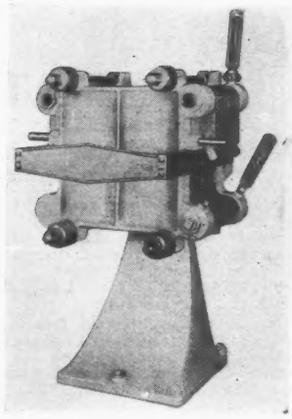
Steel Chains—An illustrated, 144-page catalog by Link-Belt Co., 910 South Michigan Ave., Chicago, Ill., brings the information on the older types of chains up to date and describes a number of new and useful sizes.

Baker's Recipes—Commercial formulas for the production of bread, rolls, cakes, and other baked goods are given in a mimeographed booklet by Evaporated Milk Association, 203 North Wabash Ave., Chicago, Ill.

Rubber Goods—Designed as an aid in the selection of belting, hose and other products, a 24-page illustrated booklet by B. F. Goodrich Rubber Co., Akron, Ohio, contains a quantity of handy engineering data. Included are tables enabling the manufacturer to figure the required sizes and plies of conveyor belt without using a formula and to estimate the pressure required to deliver a desired quantity of liquid through hose of various diameters.

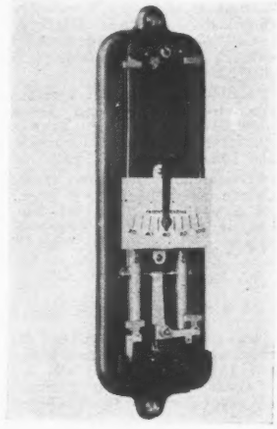
Small Heat Exchanger Of Plate Type

A small, plate-type heat exchanger supported on a pedestal and requiring floor space of only 2 ft. 8 in. x 2 ft. 5 in. is manufactured by York Ice Machinery Corp., York, Pa. The unit is particularly suitable for the smaller dairy as a preheater, full heater or cooler, handling up to 4,000 lb. per hour. In larger dairies it will find use as a brine-type raw-milk precooler, having a capacity of 10,000 lb. per hour, and as a preheater, handling up to 6,500 lb. per hour.



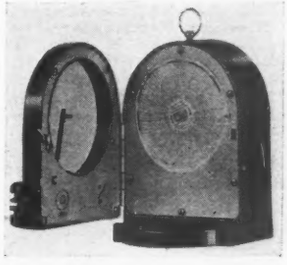
Humidity Controller

Human hair is used as the hygroscopic element in a humidistat announced by Julien P. Friez & Sons, Inc., Baltimore, Md. The hair elements are treated to free them from appreciable shift of calibration and to make them highly sensitive. The instrument operates effectively right up to the saturation point at temperatures as high as 175 deg. F., is easily cleaned and is low in cost, according to the maker. The humidity controller is ordinarily used as a three-wire instrument in conjunction with a relay, but contacts for high and low humidity control may be employed.



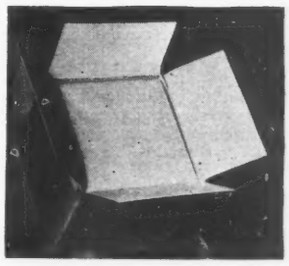
Instruments Check Refrigerators

Simplicity, practicality and low cost are said to be incorporated in a recording thermometer and in a companion motor-operation recorder which have been developed by Practical Instrument Co., 2717 North Ashland Ave., Chicago, Ill. The two instruments will give a 24-hour record of temperature and of compressor operation for electrically driven refrigerating units. Both are inclosed in a Bakelite case, 5½x4½x7⅞ in., with space provided for an ink bottle and 25 charts. A 36-hour clock mechanism drives the charts. In operation, the thermometer is simply wound and placed in the refrigerator and the operation recorder is wound and connected in series with the power supply and the compressor motor.



Light Fiber Cartons For Bulk Butter

Savings in initial cost, in storage space, in time required for set-up and in freight charges are attributed to a solid fiber carton made for handling butter in bulk by Container Corporation of America, 111 West Washington St., Chicago, Ill. The butter shipped in bulk can be printed and put back into the cartons, giving them a secondary use; the 63-lb. carton will hold 50 one-pound prints. The container is provided with a paraffined, cylinder-formed jute liner which is resistant to moisture and does not impart taste or odor to the butter. These fiber cartons are several pounds lighter than the old style tubs and, being rectangular, take up less space.



One-Piece Screw Cap For Vacuum Seal

Low cost and ease of opening are characteristics attributed to a one-piece screw cap developed by Aluminum Seal Co., New Kensington, Pa., as a reclosure vacuum seal. The cap is of the roll-on type and is provided with a newly developed "lubricated" rubber compound sealing medium which is flowed into place in the top of the cap and then vulcanized. This sealing medium, which is put on before delivery to the packer, obviates sticking.

PATENT DIGEST

Baking and Milling

Method of Preparing Two-Layer Biscuits in Which Second Layer Is Formed and Placed on First Layer in Continuous Manner From Scrap of Dough as Formed—Edward Milner, Crosland, Newton-Le-Willows, England. No. 1,883,592. Oct. 18, 1932.

Yeast Propagated in Continuous Manner so as to Maintain Constant Weight of Yeast Per Unit Volume of Propagating Wort—Sren Sak, Charlottenlund, Denmark. No. 1,884,272. Oct. 25, 1932.

Commercial Preparation of Fruit Duff Mixture—Anna Cresswell Turner, Riverdale, Md. No. 1,884,923. Oct. 25, 1932.

Bread Cooled by Passage Through Air-Conditioned Tunnel Direct From Baking Ovens—Wade W. Reece and Louis W. Haas to W. E. Long Co., Chicago, Ill. No. 1,885,-142. Nov. 1, 1932.

Uncooked Biscuits Packaged to Permit Expansion in Size and Accomplish Sealing of Container After Expansion Takes Place—Charles Lorber, Louisville, Ky. No. 1,887,162. Nov. 8, 1932.

Mixture of Dextrose and Acid Calcium Lactate in Which a 5 Per Cent Solution Has a pH of 6.1 to 3.1 for Use as Yeast Food or Dough Improver—Einar Woxvold, Chicago, Ill., to American Maize Products Co. No. 1,887,175. Nov. 8, 1932.

Canning and Glass Packing

Canned Foods Sterilized by Providing an External Fluid Pressure Upon the Container That Is in Excess of the Pressure Within the Container at All Temperatures During the Sterilizing Operations—George W. Mullen, Flushing, N. Y., to Anchor Cap & Closure Corp., Long Island City, N. Y. No. 1,881,885. Oct. 11, 1932.

Canned Corn Subjected to 260 Deg. F. During Part of Processing Time and Then to Receding Temperatures During Balance of Time—Ogden S. Sells, San Francisco, Calif., to Sprague-Sells Corp., Hoopestown, Ill. No. 1,884,300. Oct. 25, 1932.

Flavoring in Tablet Form With Low Solution Factor Added to Packaged Food Products so That Solution Takes Place After Sealing—Gerhart S. Suppiger to Scientific Tablet Co., Belleville, Ill. No. 1,887,073. Nov. 8, 1932.

Confectionery

Layered Confection of Ice and Fudge Containing Glycerin—Louis F. Trettin to Hugh K. Wagner and Walter H. Nohl, St. Louis, Mo. No. 1,886,763. Nov. 8, 1932.

Confection Consisting of Concentrated Vitamin Extract Preserved by Incorporating Into Citrous Fruit Mass—Elliott Ritchie Alexander, Orlando, Fla., to Vitamin Co. of America. No. 1,886,931. Nov., 8, 1932.

Method of Producing Candy Centers in a Continuous Manner Without Use of Starch Board—Theodore and Charles Werner to John Werner & Sons, Inc., Rochester, N. Y. No. 1,886,858. Nov. 8, 1932.

Dairy and Egg Products

Ice Cream Manufactured in a Continuous Manner Under High Rate of Agitation in Second Refrigeration Stage—John J. Glauser, Pittsburgh, Pa. No. 1,882,660. Oct. 18, 1932.

Nut Flavored Coating for Ice Cream Pies Made From Skim Milk, Powdered Sugar, and Vegetable Fat With Melting Point Above 76 Deg. F.—Howard Beatty and Charles Mongere to Glidden Food Products Co., Chicago, Ill. No. 1,883,484. Oct. 18, 1932.

Freezing Point of Egg Yolk Lowered by Treatment With an Edible Acid, a Salt and Sugar for Use as Emulsifying Agent in Mayonnaise—Albert K. Epstein, Chicago, Ill. No. 1,883,652. Oct. 18, 1932.

Powdered Protein Milk for Infant Feeding Prepared by Spray Drying of Mixture of Whole Milk Curd and Lactic Acid Skim Milk—Lambert D. Johnson and Nathan F. True to Mead, Johnson & Co., Evansville, Ind. No. 1,882,637 and No. 1,882,638. Oct. 11, 1932.

Egg Yolk for Manufacture of Egg Noodles Made More Fluid by Means of a Peptizing Agent—Albert K. Epstein and Benjamin R. Harris, Chicago, Ill. No. 1,883,653. Oct. 18, 1932.

Fruits and Vegetables

Fruit Juice Powder From Spray-Dried Mixture of Juice and Finely Ground Cooked Rind of Citrus Fruits—Robert M. Washburn, Evanston, Ill., to Liquid Dehydration Corp., Chicago, Ill. No. 1,883,150. Oct. 18, 1932.

Fruit Juices Preserved by Treatment With Inert Gases Under High Vacuum and Simultaneous Treatment With an Alternating Electric Current—Henry C. Stephens to Hazel-Atlas Glass Co., Wheeling, W. Va. No. 1,883,420. Oct. 18, 1932.

Spray Residue Removed From Fruit and Vegetables by Treatment With Water Solution of Hydrochloric Acid and Ferrous Sulphate Followed by Washing With Water—Reginald H. Robinson, Corvallis, Ore., to the Citizens of the United States. No. 1,885,100. Oct. 25, 1932.

Homogenized Citrous Fruit Concentrate—Elliott Ritchie Alexander, Orlando, Fla., to Vitamin Co. of America. No. 1,885,401. Nov. 1, 1932.

Dried Fruits and Raisins Treated by Submerging in Boiling Water to Which Coconut Oil Has Been Added—Arthur H. Sanders, Fresno, Calif. No. 1,886,233. Nov. 1, 1932.

Meat Packing

Smoking Salt Prepared by Agitating in Drums Through Which Passes Controlled Quantity of Smoke—John Reid, Lyons, Kan., to Diamond Crystal Salt Co., St. Clair, Mich. No. 1,882,904. Oct. 18, 1932.

Fabric Casing Covered With a Gelatinous Material Containing Glycerin and Saltpeter—Ralph Ettlinger to Ettlinger Casaks Mfg. Co., Kansas City, Mo. No. 1,883,657. Oct. 18, 1932.

Copies of Patents

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

Photostatic copies of foreign patents may be obtained at the same address, prices being forwarded on application.

Copies of patents should be ordered by number, as titles used in this digest seldom correspond with title of patent.

Miscellaneous Products and Processes

Pectin and Agar in Dry Powdered Form Used to Impart Stability and Smoothness of Texture to Water Ices and Sherbets—Grover D. Turnbow, Davis, Calif. No. 1,878,203. Sept. 20, 1932.

Oil Removed From Shell of Cashew Nuts by Zone Heat-Treatment in Chamber Provided With Means for Keeping Nuts Separated From Liberated Oil—Thomas M. Rector, Rutherford, N. J., to Vitapack Corp., New York, N. Y. No. 1,884,860. Oct. 25, 1932.

Sugar Extracted From Cane Molasses Containing Glucose by Treating Molasses With a Solution of Barium Hydroxide—Guilford M. Spencer by Emma F. Spencer, executrix, Brooksville, Me., to Cuban-American Sugar Co., New York, N. Y. No. 1,884,901. Oct. 25, 1932.

Vegetable Oils Refined by Treatment With Alkylolamine—Ludwig Rosenstein and Walter J. Hund, San Francisco, Calif. No. 1,885,859. Nov. 1, 1932.

Sugar Separated From Sugar Solution Containing Glucose by Treatment With Barium Hydroxide Solution—George P. Meade, Gramercy, La., and Ralph N. Traxler, Rahway, N. J., to Cuban-American Sugar Co., New York, N. Y. No. 1,884,798. Oct. 25, 1932.

Grain Extracts in Cereal Beverage Manufacture Separated From Solid Matter by Vacuum in Such Manner That Overlying Layer of Water Does Not Dilute Extract—Albert E. Becker, Ogden, Utah. No. 1,882,738. Oct. 18, 1932.

THE GOVERNMENT PUBLISHES

DOCUMENTS ARE AVAILABLE *at prices indicated from Superintendent of Documents, Government Printing Office, Washington, D. C. Send cash or money order; stamps and personal checks not accepted. When no price is indicated, pamphlet is free and should be ordered from bureau responsible for its issue.*

Starches. Bureau of Foreign and Domestic Commerce, Foodstuffs Division; mimeographed; 10 cents; copies should be purchased from the Bureau. General information on starches with statistics for domestic production, imports and exports.

Cheese. Bureau of Foreign and Domestic Commerce, Foodstuffs Division; mimeographed; 10 cents; copies should be purchased from Bureau. General information and statistics.

Progress in Biological Inquiries 1931, by Elmer Higgins. Department of Commerce, Bureau of Fisheries; 10 cents.

New Methods of Opening Oysters and Improving Their Condition for Market, by V. Koehring and H. F. Prytherch. Department of Commerce, Bureau of Fisheries Investigational Report No. 15; 5 cents.

Developments in Refrigeration of Fish in the United States, by James M. Lemon. Department of Commerce, Bureau of Fisheries Investigational Report No. 16; 5 cents.

Fruit and Nuts. Bureau of Census, General Report on Agriculture, Chapter XII; 10 cents.

An Economic Study of the Pecan Industry, by S. A. Jones and others. Department of Agriculture Technical Bulletin 324; 10 cents.

Index of Analyses of Natural Waters in the United States, 1926 to 1931, by W. D. Collins and C. S. Howard. U. S. Geological Survey Water-Supply Paper 659-C; 5 cents.

Shipping Samples and Catalogs. Bureau of Foreign and Domestic Commerce, Trade Promotion Series No. 72 (revised); $1. Summarizes the methods for shipping samples and catalogs to foreign countries in order to comply with customs and trade regulations at the country of destination.

Foreign Commerce and Navigation of the United States, Calendar Year 1931. Bureau of Foreign and Domestic Commerce; $2.25. Statistics of imports and exports.

Federal Specifications. New or revised specifications of the Federal Specifications Board on: Cheese, Swiss, C-C-301; Sausage, Bologna style, PP-S-71; Sausage, Frankfurter style, PP-S-81; Sausage, pork, PP-S-91; Sausage, Vienna style, canned, PP-S-101. Specifications available from the Bureau of Supplies and Accounts, Navy Department.

Production Statistics From 1931 Census of Manufactures in preliminary mimeographed form for: Coffee and spices, roasting and grinding; confectionery; grease and tallow; sausage and sausage casings; shortenings (other than lard), vegetable cooking oils and salad oils.

A Happier New Year

• The year draws to a close and kindly Nature dims the memory of trying days gone by. Our faces turn resolutely toward the future, no less full of problems than the past. We have much to be grateful for, despite the burdens we have carried. Our difficulties and sacrifices are not without their value, for through them do we learn the sympathy that is due to others who also have suffered.

• May strength and courage and wisdom aid us in the combat with the invisible, intangible enemy to the happiness of mankind. No greater gift can we desire today than peace on earth, good will to men.

Gift Suggestion

• A holiday gift to associates and subordinates that is worth while, dignified, yet not costly, is a subscription to FOOD INDUSTRIES. Some companies in the past have presented subscriptions to the entire sales and executive force.

Bind Your Volumes of Food Industries

• With this issue is bound the complete index of Volume 4. The format and make-up of FOOD INDUSTRIES are designed to facilitate binding, and every volume is completely indexed.

• Every plant should have its technical library, and in every factory library should be found a complete set of bound copies of FOOD INDUSTRIES.

• You cannot purchase previous volumes of F.I. They simply do not exist. You must bind your own copies every year or you do not have them. Many a subscriber has paid more for photostat copies of past articles than the actual binding cost would ever amount to.

• If men in your company like to clip out articles of particular interest, it would be well to order an extra subscription for filing and binding.

Coming Events

• Fine Points of Fumigation; Manufacturer's Side of the Spot Stock Question; Up-to-the-Minute Information on Flour Distribution; Price-Maintenance, What It Can and Cannot Do; Is It Worth While for the Manufacturer to Go Along With the Voluntary Chain? What's Ahead for the Food Industries—a Forecast Issue.

FOOD INDUSTRIES

The Journal Devoted to the Problems of the Food Manufacturer

LAURENCE V. BURTON, *Editor*

M. A. WILLIAMSON, *Publishing Director*

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Everybody Likes the New Hot Biscuits Made From Modern Prepared Flour .....

The public has caught on. People are eating—and enjoying—more hot biscuits than ever before because this new process makes biscuits that are lighter—more palatable—readily digestible—and convenient to serve.

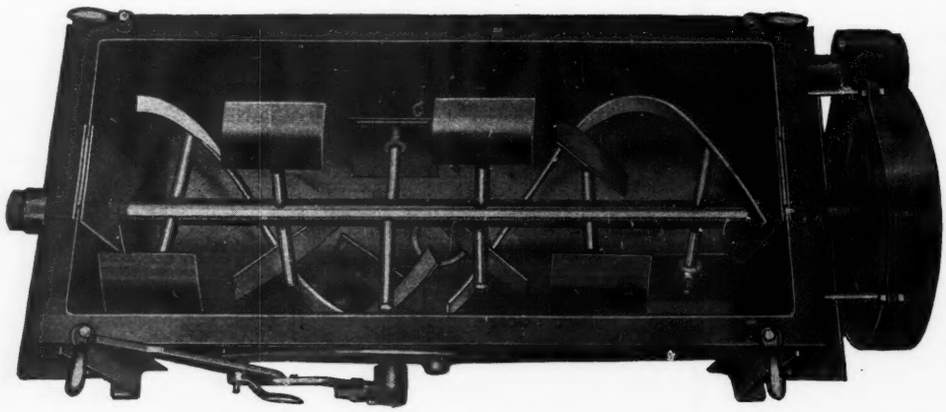
Hot biscuits have always been popular but with the advent of PREPARED biscuit flour the consumption of this delectable food has increased to an almost unbelievable volume. This offers you a great opportunity for marketing your flour on a most profitable basis and if you want to know what the finest kind of prepared biscuit flour is like, let us prepare a sample batch for you, using your flour and the UNIQUE Patented Trowel Type Mixer. Then try it—and have your friends try it. The result will convince you.

The Highest Quality of Prepared Biscuit Flour is Made on the

UNIQUE "Patented" Trowel Type Mixer

Only by the use of this "Patented" mixer can you hope to obtain the result you desire—that of rapidly and thoroughly blending unheated shortening with flour to insure a finished product, in which the shortening appears, under the microscope, in the form of minute flakes, and in which the flour retains its full absorption.

This new UNIQUE system of blending in the unheated shortening is far superior to any other method attempted. The time element is a very important factor because excess rubbing and tumbling of the shortening with the flour results in deterioration and causes the flour particles to become coated with shortening, making them "water proof" and consequently destroying the absorption quality so necessary to the baking of light, palatable and readily digested biscuits.



This "Patented" UNIQUE Mixer with Trowel Mixing Blades mixes unheated shortening—(any good hydrogenated fat)—with flour without the use of heating tanks, spraying devices or other auxiliary equipment. Because the product is mixed cold, the possibility of deterioration and rancidity have been minimized. The machine is so efficient that a batch may be completed in a few minutes time. It eliminates all possibility of the product forming lumps or streaks and insures a product of uniform texture with superior flavor and highly desirable baking qualities.

NOTE: This is the only mixer on the market that will intimately associate oils and other liquids with dry powders. The patented trowels keep the ingredients smoothed out and insure a perfect blend throughout the batch.

Write for samples and complete information.

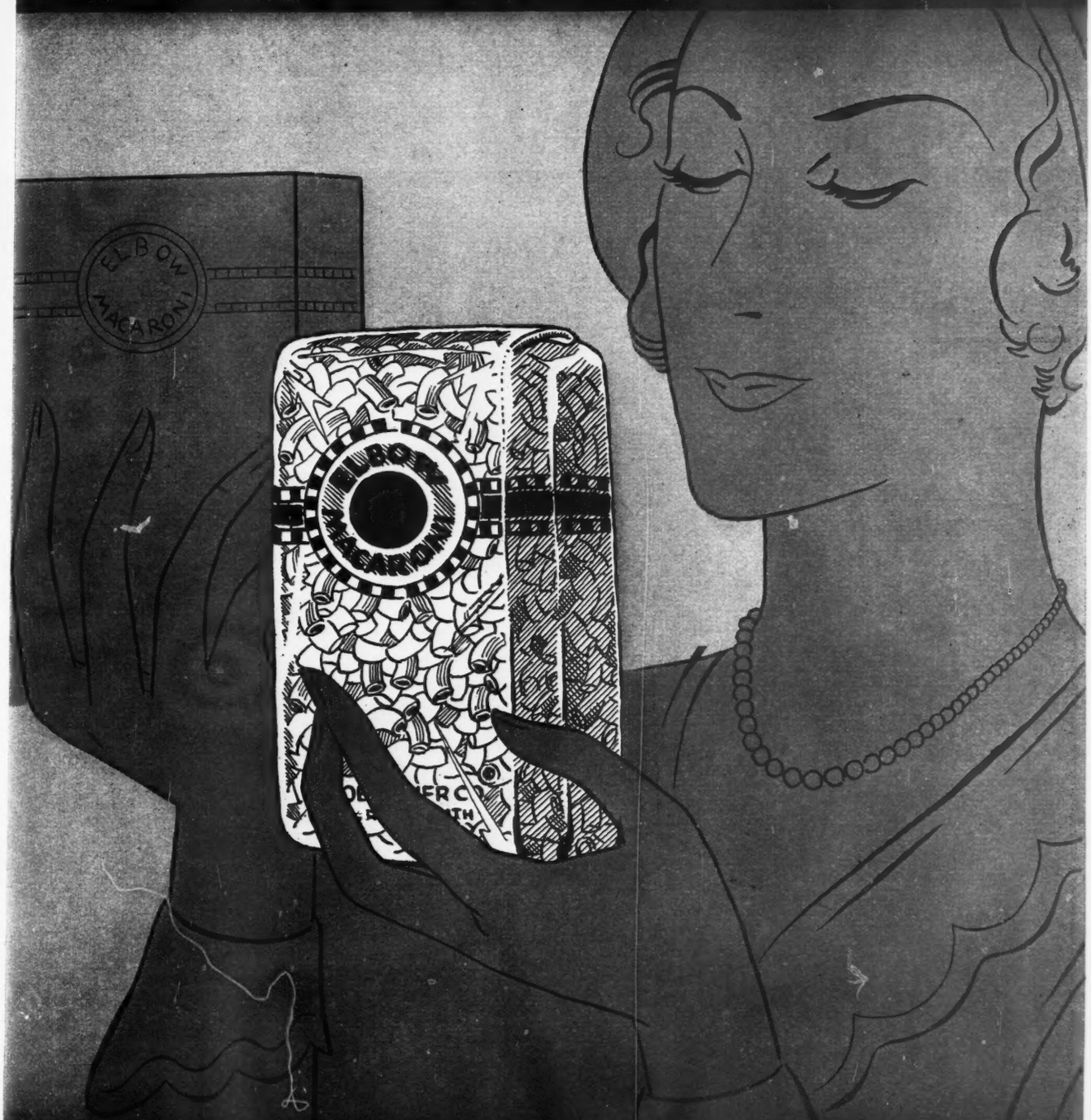
ROBINSON MFG. CO.

71 PAINTER ST. MUNCY, PA.

Complete Food pocessing Equipment—PLUS—A Helpful Engineering and Advisory Service.

CRUSHERS
GRINDERS
PULVERIZERS
SIFTERS
MIXERS
ELEVATORS
CONVEYORS
SPECIAL ITEMS

A TALE OF TWO PACKAGES

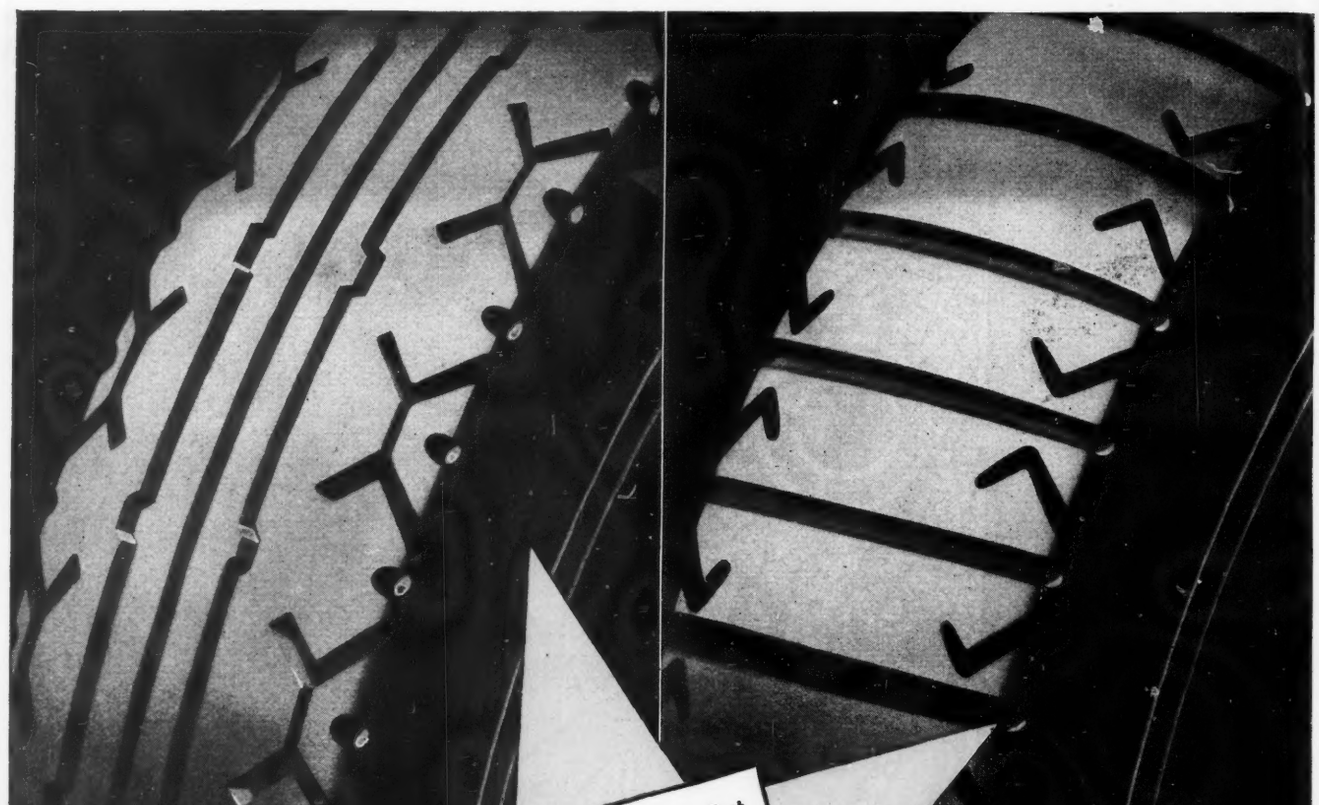


THEY CONTAIN THE SAME FOODS - THEY SELL AT THE SAME PRICE-
THE QUALITY IS THE SAME - BUT WHAT A DIFFERENCE IN SALES!

Foods packed in Royal Cellophane bags lend themselves to modern merchandising displays, they win preferred positions in retail stores. They add New Sales appeal to old established brands. May we send samples?

THOMAS M ROYAL & COMPANY
5800 NORTH 7th STREET · PHILADELPHIA PA

IF ALL BUSINESS


Not Two Tires . . . But one Tire with Two Treads.
•Two pictures of the Same Seiberling Air cooled Tire. On the left, the first tread has started on its record breaking run. On the right, the patented holes have formed the second anti-skid tread. It lasts the life of the tire.

SEIBERLING

PROBLEMS WERE AS SIMPLE AS THIS·· WHAT A LIFE!

Think of the time you would save if all business problems were as simple as this.

You need to read only one dozen words to know the difference in tires. Here are those words: *Seiberling Air Cooled Tires give 51% more rubber for only 18% more cost!*

A simple invention enables Seiberling to build a tire that steps far ahead of the field. That invention is Air Cooling. Holes run crosswise through the tread. As the tire revolves and the holes open and shut, cool air is forced through and heat—the internally generated heat that makes it necessary for other manufacturers to keep tread thicknesses down—is carried off. Air Cooling patented by Seiberling makes possible this thicker tread.

But—there is more to this tire than its far thicker tread. Yes, more than record-breaking mileage, almost complete elimination of punctures, easier riding, and lower cost per mile. For those holes also make this the only tire in the world THAT NEVER WEARS SMOOTH.

When the first deep tread is gone, these holes form a *second* tread. This *second* tread grips and protects against skids, right down to the last mile. These are the facts — simple and understandable.

Learn more about this remarkable tire. 'Phone your local Seiberling Dealer—or, if you don't know his name, write to the Seiberling Rubber Company, Akron, Ohio.

AIR-COOLED TRUCK & BUS **TIRES**

Eye Appeal *and* Profits

The sales value of a Superior Package

Keen merchandisers realize that EYE APPEAL is one of the most important requisites in making sales . . . This is especially true of packaged goods.

Notice how often a purchaser selects one product in preference to another, chiefly because of a superior package. And in most cases the choice is wisely made—for the public has learned by experience that the better products are invariably in modern, attractive packages, scientifically designed to keep the goods in first-class condition.

Competition for the consumer's favor has made package standards higher than ever before. And the makers of packaging machinery and package material have kept abreast of this trend.

New Possibilities in Package Design

Today you have a wide choice in the type of package you may use—you can design a package especially suited to your product, a package that has individuality and eye-appeal.

Our machines are making packages with practically every known form of packaging material—plain Cellophane, printed Cellophane, printed paper wrappers, glassine, foil, cardboard, etc.—and in a multitude of forms.

Lower Costs with Modern Machines

A package improvement does not necessarily mean increased cost. Indeed, the very machines which make the improvement possible, often lower costs because of their higher efficiency.

Consult Us

With our wide experience, and intimate knowledge of modern trends we can give you real assistance in carrying out your package improvements.

Consult our nearest office.

PACKAGE MACHINERY COMPANY
Springfield, Massachusetts
New York Chicago Los Angeles
London: Baker-Perkins, Ltd.

PACKAGE MACHINERY COMPANY

Over 200 Million Packages per day are wrapped on our Machines

VACUUM

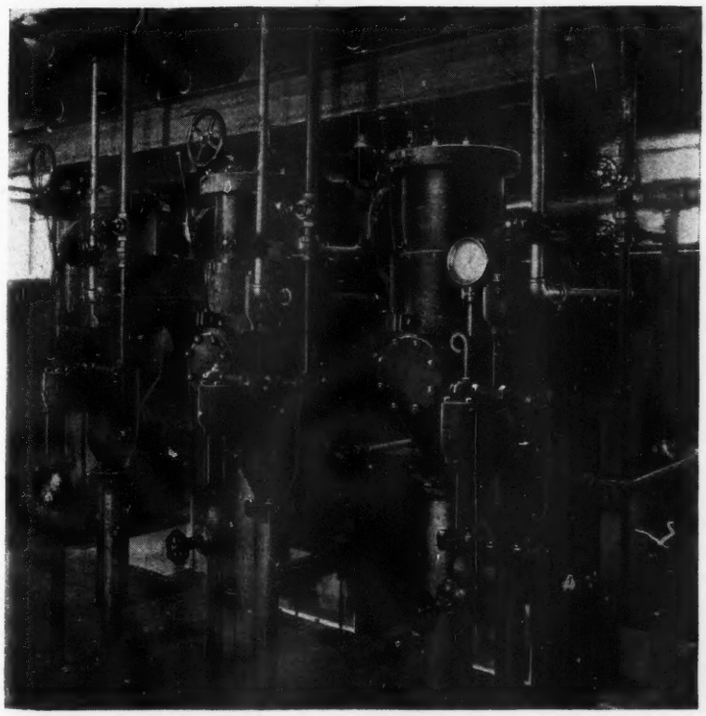
PACKING . . . . . PROCESSING

The answer to price competition

Vacuum packed or processed foods are crashing through to profitable sales in spite of disastrous commodity prices. The marked quality improvement obtainable through high vacuum technique commands a premium in all markets.

And more than that—this higher quality is obtained at lower production cost. Spoilage, shrinkage and other losses are reduced or eliminated.

ELLIOTT *Steam Jet* AIR EJECTORS



An installation of three Elliott two-stage ejectors serving barometric condensers, and maintaining high vacuum on evaporators in a food plant. High vacuum processing in this plant makes possible a product which cannot be produced at atmospheric pressure.

Elliott made most of the spectacularly successful pioneer high vacuum installations. With that experience, plus information gained by extended research, we are in a position to give you sound, authoritative advice in the application of vacuum or the use of higher vacuum than you are now using in your process. The detailed advantages of Elliott ejectors can easily be brought to light through a discussion with an Elliott representative. Call us in.

ELLIOTT COMPANY

PITTSBURGH, PA.

Heat Transfer Department
JEANNETTE, PA.

District Offices in Principal Cities

PIONEERS IN THE DESIGN, CONSTRUCTION AND APPLICATION OF STEAM JET EJECTORS

G-301

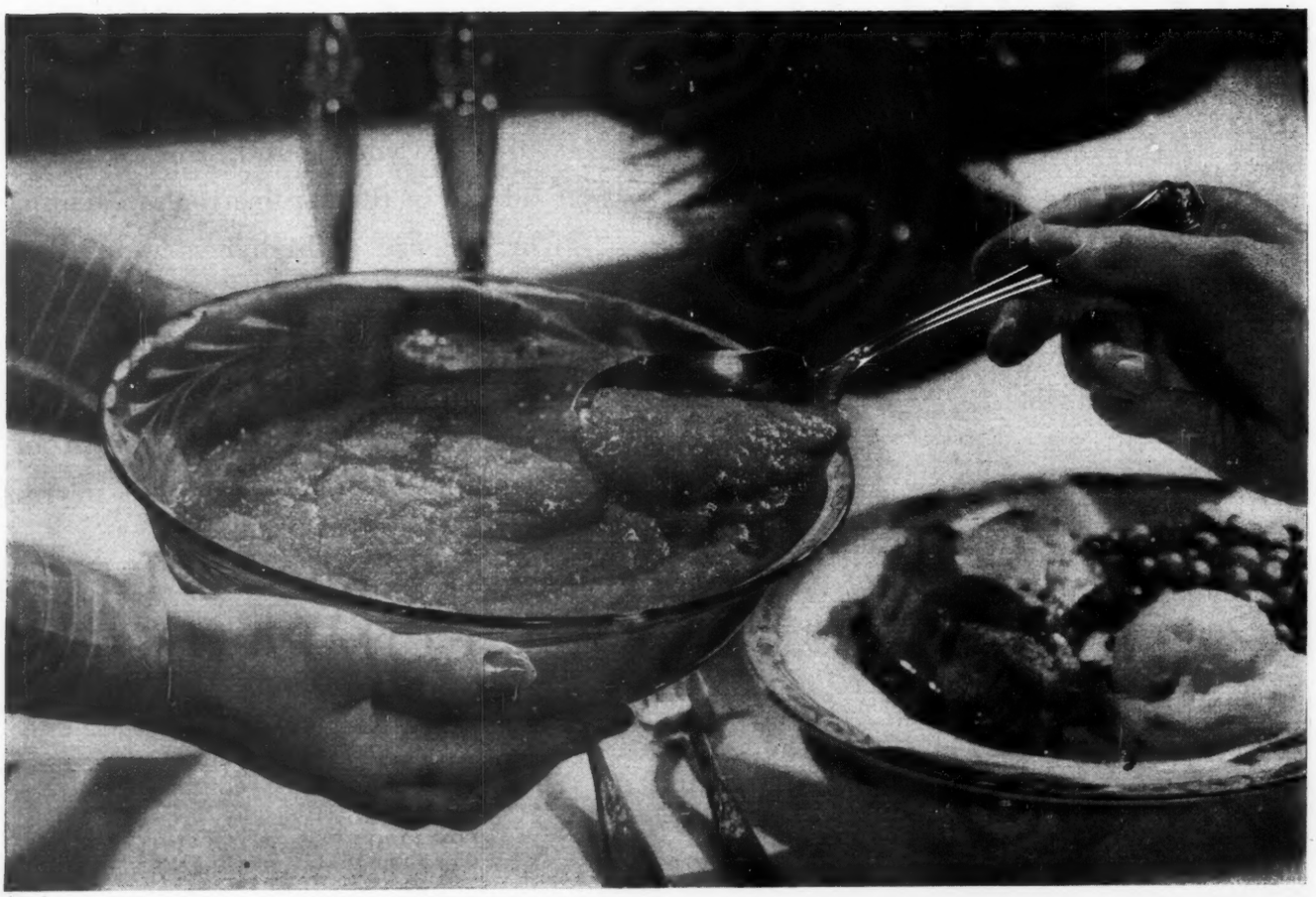
Canned Applesauce

EVERY day, women who have never used canned applesauce before, decide to try it for its convenience. Will they like it and buy it again—or go back to making their own? That depends on the quality inside the can.

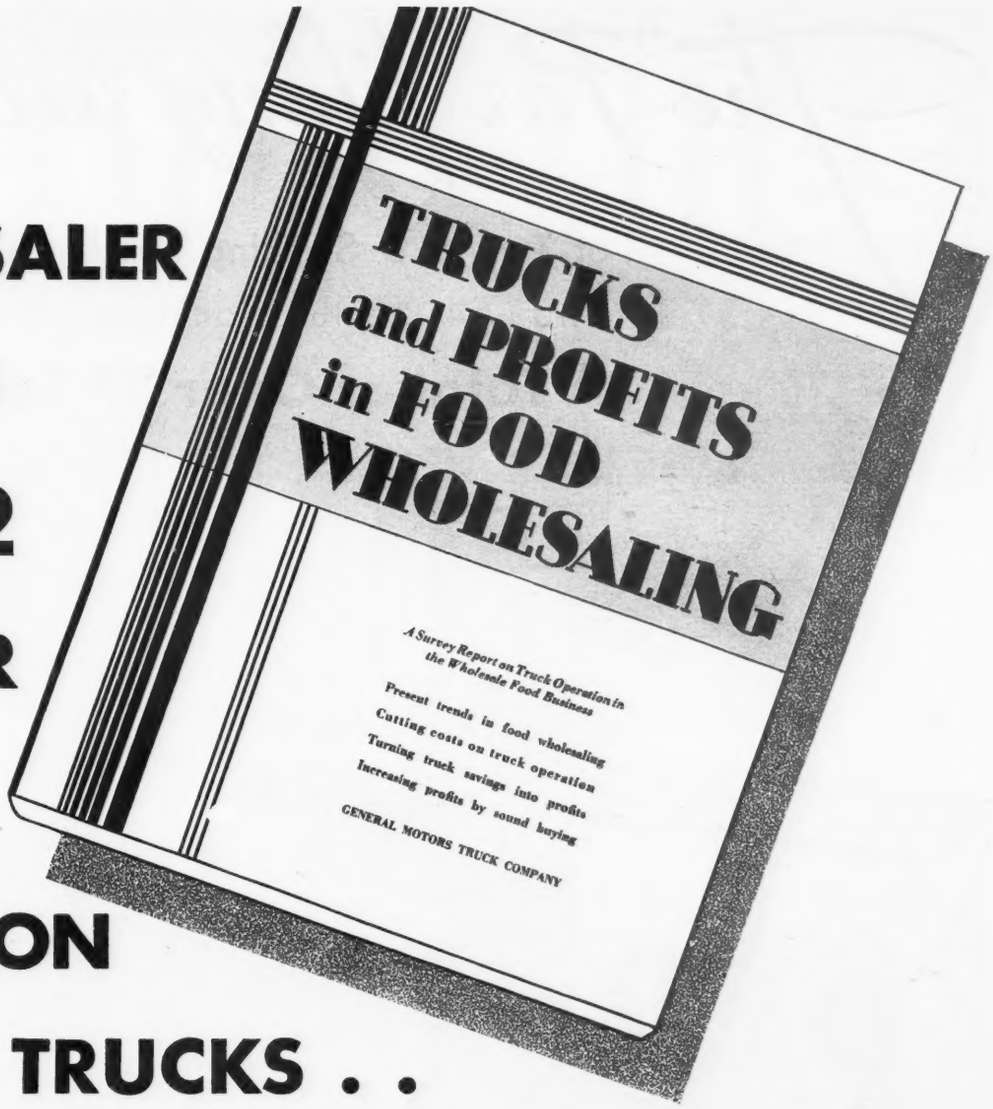
The canner who knows that repeat sales are the only kind that build a lasting business, stresses quality in every phase of his production—selects good, sound picked fruit—trims and pares and washes carefully to remove bruised spots and foreign matter which otherwise might get into the can—holds the fruit under cold water, after it is shredded, to keep it from getting dark—fills the cans very hot and very full—cools thoroughly to keep the applesauce from discoloring. And the canner who does all these things well, finds they help him sell his brand.

Much data concerning every phase of applesauce canning has been accumulated by the Research Department of the American Can Company. Perhaps there is some problem confronting you, perhaps an opportunity for better quality in the can. If so, call on Canco, as others are doing. We will gladly help.

AMERICAN CAN COMPANY CANCO



A WHOLESALER saved $3,152 A YEAR on the OPERATION OF FIVE TRUCKS . .


TRUCKS and PROFITS in FOOD WHOLESALING
A Survey Report on Truck Operation in the Wholesale Food Business
Present trends in food wholesaling
Cutting costs on truck operation
Turning truck savings into profits
Increasing profits by sound buying
GENERAL MOTORS TRUCK COMPANY

More efficient dispatching, as recommended in "Trucks and Profits in Food Wholesaling," enabled a wholesale grocer to save $3,152 a year on the operation of five trucks. And the majority of his deliveries were made more promptly than ever before.

"Trucks and Profits in Food Wholesaling" shows you how to eliminate waste on your "outside operations" just as you have eliminated it inside your warehouse. It will help you end the losses from old, inefficient delivery methods. It analyzes every factor in the cost of delivering, from the arrangement of your loading platform to the supervision of drivers and salesmen.

Transportation engineers compiled this "book of experience" after making a comprehensive study of the delivery methods employed by the most successful wholesale grocers all over the country. They put into it the same kind of sound knowledge that a high-salaried delivery expert might bring you.

"Trucks and Profits in Food Wholesaling" is a book that every grocery wholesaler, whether he runs one or a hundred delivery trucks, should read. It's interesting, and concise, and very helpful. Mail the coupon for a copy, with our compliments.

General Motors Truck Company, Pontiac, Michigan
Send me, without charge or obligation, your book, "Trucks and Profits in Food Wholesaling."

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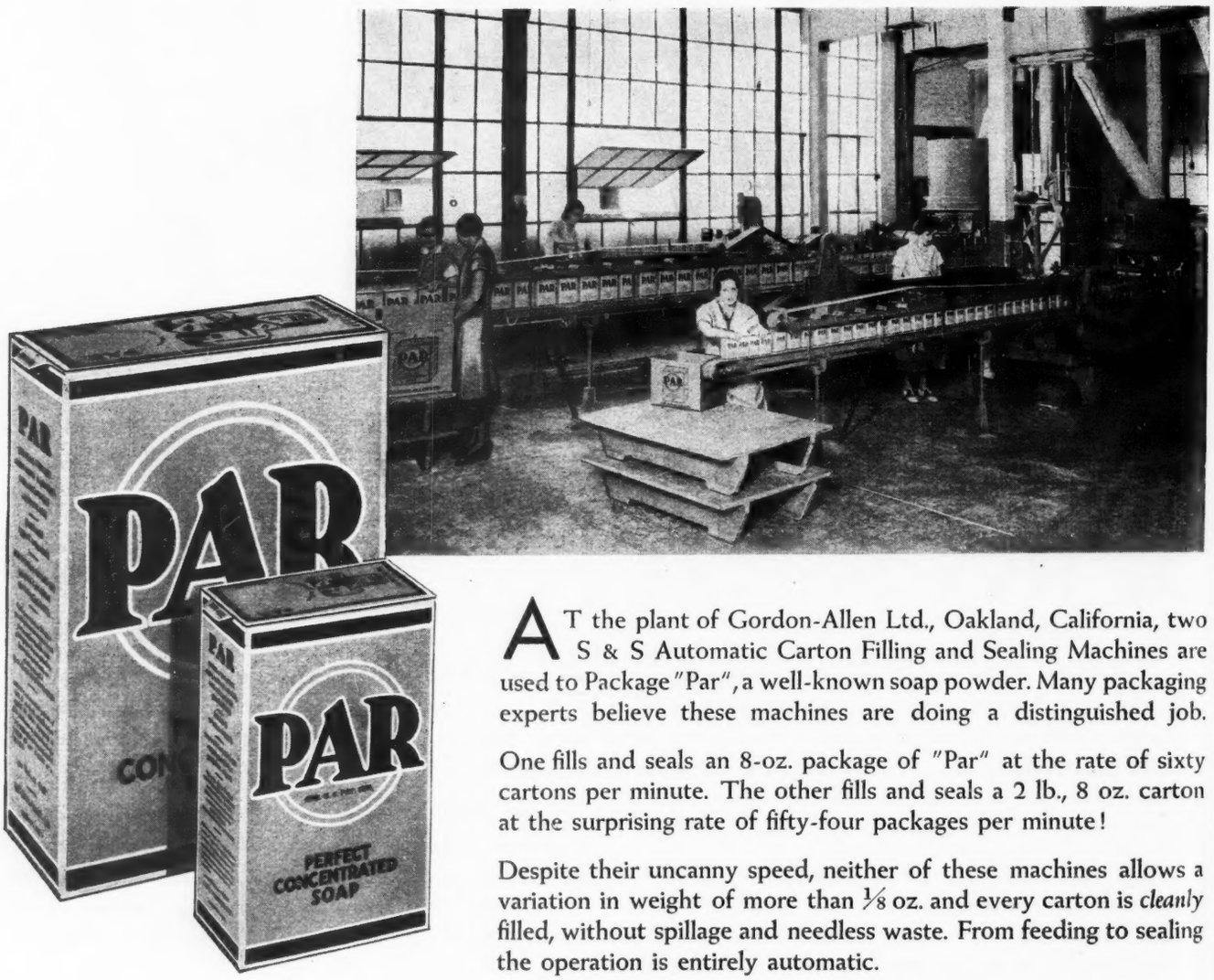
GENERAL MOTORS TRUCK COMPANY

PONTIAC ***(A Subsidiary of Yellow Truck & Coach Mfg. Co.)*** **MICHIGAN**

The "Par" filling record

of Two S & S Filling Machines is 60 8-oz. and 54 2½-lb. Packages per Minute

A Total of Over 37 Tons per Day!



AT the plant of Gordon-Allen Ltd., Oakland, California, two S & S Automatic Carton Filling and Sealing Machines are used to Package "Par", a well-known soap powder. Many packaging experts believe these machines are doing a distinguished job.

One fills and seals an 8-oz. package of "Par" at the rate of sixty cartons per minute. The other fills and seals a 2 lb., 8 oz. carton at the surprising rate of fifty-four packages per minute!

Despite their uncanny speed, neither of these machines allows a variation in weight of more than ⅛ oz. and every carton is *cleanly* filled, without spillage and needless waste. From feeding to sealing the operation is entirely automatic.

The S & S Fillers used for packaging "Par" are one of many styles of Stokes & Smith Fillers carefully engineered for many different purposes and time-tried in many different plants with hundreds of different materials.

STOKES & SMITH Co

PACKAGING MACHINERY
BOX MAKING MACHINERY
4911 Summerdale Ave., Philadelphia, Pa.

★ *For economy and success, send your filling problems to S & S*

100,000 Miles

WITH NEVER A TIRE CHANGE!

The Merchants Biscuit Company's rural delivery truck, which one set of Goodyear Balloons carried 100,928 miles.

THE Merchants Biscuit Company of Denver, Colorado, put a handsome new truck into rural delivery service in October, 1929, equipped with Goodyear All-Weather Tread Tires, singles front and duals rear.

"The tire experience on this truck is certainly worthy of comment," writes Mr. Wendell F. Ellsworth.

"After 100,928 miles, when the truck was replaced, the six original tires were still in service. Needless to say, this performance was very gratifying; in fact, quite interesting, as after 50,000 miles these tires became the interest and curiosity of many individuals along the 4,000-miles-a-month route.

"Another unusual fact was that in this long distance mileage we had only five punctures, none of which caused a tire change on the road. The non-skid design of the tire made it possible to go this great distance without using chains, even during some of the bad winter months weather."

Long distance mileage, freedom from trouble, All-Weather Tread traction in any going. **It is these qualities that earn Goodyear Tires preference to the point where *"more tons are hauled on Goodyear Tires than on any other kind."***

Particularly in transporting foodstuffs, without delay, with maximum cushioning protection, you can profit by Goodyears. Your Goodyear Truck Tire Service Station Dealer has the right size and type for your delivery.

Extra valuable, too, are the advantages of Goodyear K-Rims — noted for their ease of operation, with open valve stem slot and split base; for their safety in service; and for their interchangeable mounting

THE GREATEST NAME IN RUBBER

GOODYEAR

ON YOUR NEW TRUCKS SPECIFY GOODYEARS

from PULP to POWDER

HERE is another pulverizing problem, economically solved by the Raymond system of mill-drying.

A western plant is using a Raymond air-drying Pulverizer to convert wet waste fruit pulp into a dry powder in ONE continuous operation.

The material, as fed to the mill, contains as much as 80% to 85% moisture. This single pulverizing unit reduces the moisture content to less than 10% (practical dryness), and delivers the finished product in dry powdered form.

The resulting economies are substantial — shorter and quicker process — elimination of hand labor and slow methods of drying — only one material handling operation instead of many. And the investment in Raymond equipment is much less than for other methods for the same purpose.

Perhaps Raymond methods of pulverizing, drying, separating and conveying, may be applied to your production problems. Write for information. Our 45 years' experience is at your service.

RAYMOND BROS. IMPACT PULVERIZER CO.
Main Office and Works
1310 North Branch Street, CHICAGO
200 Madison Ave. New York — Subway Terminal Bldg. Los Angeles

RAYMOND BROS. IMPACT PULVERIZER CO.
1310 North Branch Street, Chicago, Ill.

Gentlemen:
Please mail me a copy of the "NEW PROCESS" Bulletin of Raymond mill-drying methods. I am interested in pulverizing.....
(Product)

Name of Company.....

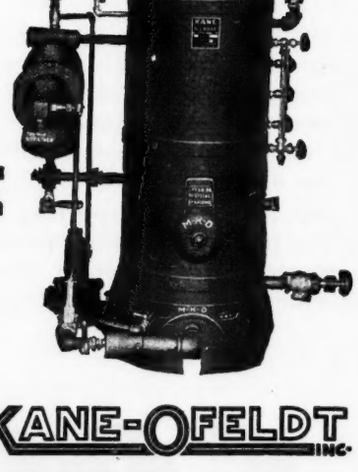
Individual and Title.....

Address.....

Peak Load~

Right now—heating and power boilers are carrying such a peak load that there is little steam left over for processing,—and what there is cannot always be relied upon for fixed temperature, pressure or degree of saturation. Now is the time an independent supply of clean steam is virtually necessary.

It can be had with the installation of a Kane Automatic Gas Fired Boiler. This boiler is a constant source of dependable steam and is a great labor-saver as well. It requires no firing or ash disposal, and long pipe lines are eliminated as the Kane can be installed close to the job. 17 sizes of Kane boilers assure your needs being exactly met. *Write for literature and full details.*



KANE

MEARS-KANE-OFELDT INC.

Executive Office and Factory
1903-1915 EAST HAGERT ST., PHILADELPHIA
Branch Offices or Distributors in Principal Cities

62 GLASS LINED BREWERY

TANKS FOR SINGAPORE!

OUT of the election of 1932 came Mr. John Q. Public's demand for the return of beer. Political experts now predict its return early in 1933. Are you prepared? Pfaudler is ready to help you.

Since prohibition, Pfaudler has kept abreast of the latest developments in the art of brewing through its export business. Only recently large installations were made in Singapore (Straits Settlements), Salisbury, South Africa, Havana, Cuba, Mexico City, Mexico, etc.

Just as in pre-prohibition days when Pfaudler equipped the finest breweries with glass lined steel cooperage, we are prepared to offer the breweries of today the same high quality glass lined fermenters, chip tanks, storage and bottling tanks — improved in design and workmanship, economical in cost.

When you purchase Pfaudler glass lined steel, keep in mind that first cost is the *only* cost . . . no revarnishing or recoopering is required. Cleaning is easiest, sanitation sure, cleaning cost less.

Catalogs and quotations free on request. Now is the time to act. Write today.

Headquarters for glass lined steel food processing equipment including: Vacuum cookers for fruit juices, preserves, jams, tomato paste, baby soups; mayonnaise mixers; tomato pulp cookers; vanilla percolators; bean soakers; pasteurizers for milk, sweet cream, sour cream, ice cream mix; automatic holding systems; transportation tanks and tank cars; complete line of storage tanks and mixers from 5 to 9500 gallons capacity.

THE PFAUDLER CO.

Works: ROCHESTER, N. Y., and ELYRIA, O. Branch Offices: NEW YORK, 8 W. 40th St.; CHICAGO, 1442 Conway Bldg.; SAN FRANCISCO, The Pfaudler Sales Co., 122 New Montgomery St.

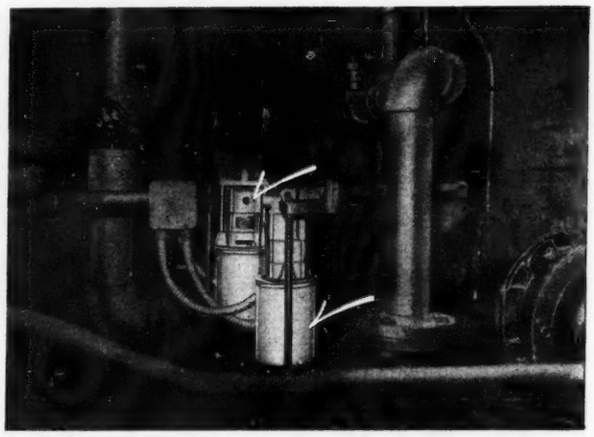
The photograph above was taken prior to the shipment of 62 Pfaudler glass lined steel brewery tanks to a new brewery in Singapore (Straits Settlements), since installed.

GLASS★LINED PFAUDLER EQUIPMENT

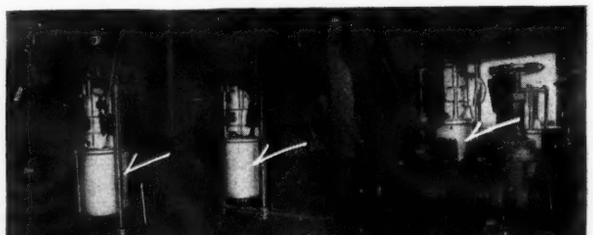
TO KEEP UP . . . . CHECK UP . . .

THRUSTOR Valves Solve Many Problems

A GENERAL ELECTRIC Thrustor valve solved the problem of automatic, accurate control of water for each batch of concrete according to weight—solved it to "our complete satisfaction" wrote the customer, and "this valve has functioned perfectly." A leather goods manufacturer writes: "The closing of the Thrustor valve, while being positive, is accomplished without sudden jar. We consider this unit to be a distinct improvement over former types of mechanical valve operation." Statements from users in a wide variety of industries attest the ability of Thrustor valves in solving difficult valving problems.



Two Thrustor valves doing a difficult job under an electric fountain



Line-up of Thrustor valves—a typical installation

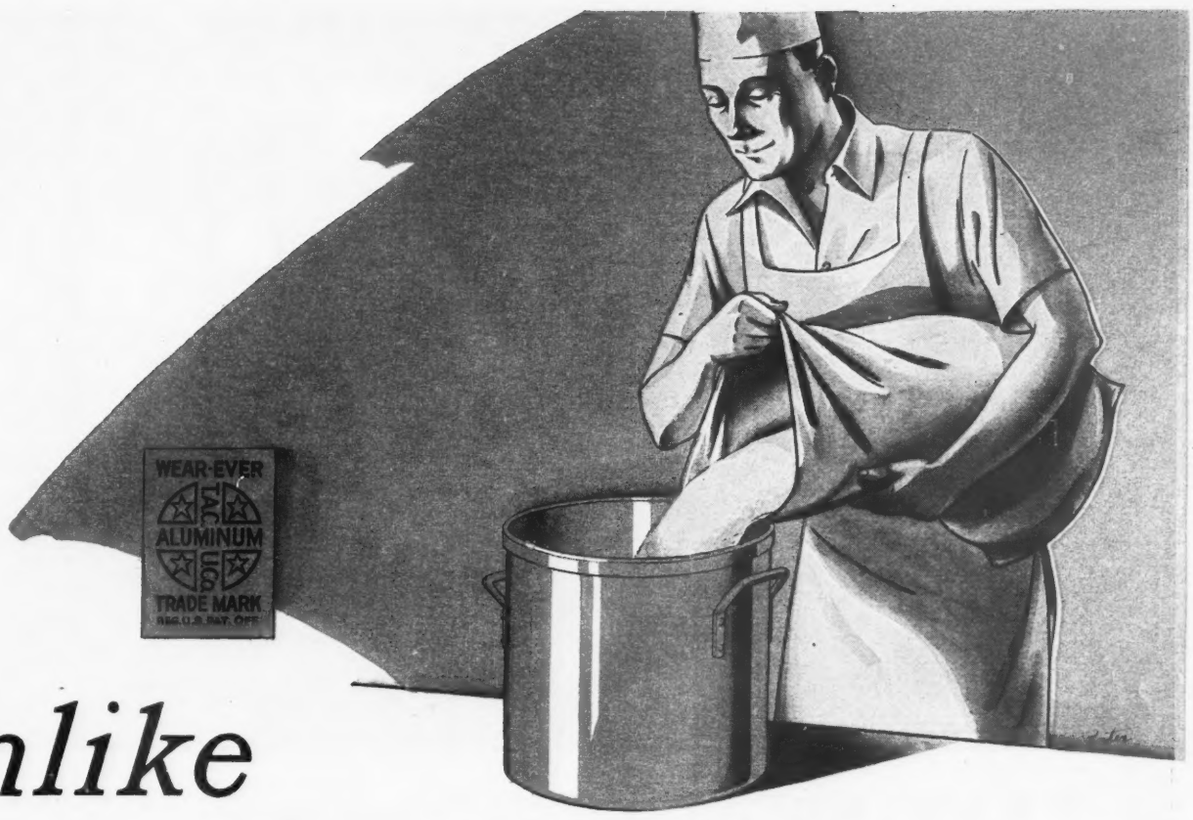
To keep up — check up your present valves. In this list—which is representative of scores of applications—check those about which you would like complete information:

- ☐ Admitting and exhausting air
- ☐ Maintaining temperature in open tanks
- ☐ Maintaining water levels
- ☐ Introducing molasses or other heavy liquids
- ☐ Control of water flow (or other liquids)
- ☐ Controlling weight of materials
- ☐ Remote control
- ☐ .....
- ☐ .....

Address your inquiry to the nearest G-E office, or General Electric Company, Schenectady, N. Y. Ask for a copy of publication GES-848, "Why Thrustor Valves?"

301-117

GENERAL ELECTRIC



Unlike

Utensils made of old-fashioned metals,

Foods keep safely in this non-rusting "Wear-Ever" Ingredient Container. Loop handles. 15 sizes—3½ qts. to 200 qts.

For safe holding of shortening, flour, sugar and icings, you can always depend on these "Wear-Ever" Semi-heavy Food Containers. They are non-rusting. They come in sizes: 1-2-3-4-6-8 quarts.

Fruits keep firm and fresh-flavored in this "Wear-Ever" Tub. Fruit acids can't corrode the thick, heavy sheet aluminum.

A special electrolytic process hardens the surface of this "Wear-Ever" Mixing Bowl. In sizes from 5½ quarts to 198 quarts.

Non-rusting! Sturdily built! This "Wear-Ever" Pail comes in 12 qt. and 14 qt. sizes. Fitted with aluminum bails and ears.

This "Wear-Ever" Preserving Kettle comes in 8 sizes ranging from 6 qts. to 24 qts. capacity.

Rust won't eat these "Wear-Ever" Aluminum Dippers, Measures and Ladles. The ladle has a long steel handle which is heavily tinned.

"Wear-Ever" Sheet Aluminum Utensils *don't need tinning*

Aluminum *won't corrode*. It resists the action of the acids in fruits, meats and other foods. It can't affect the taste or color of foods. It imparts no metallic flavor. Hence "Wear-Ever" Aluminum Utensils *never* need lining.

Consider what this means to you! With utensils made of old-fashioned metals, you have constant bills for re-tinning and loss of operating time while kettles are being tinned. On the other hand, you have uninterrupted use of "Wear-Ever" Utensils, year after year, without a thought—or a penny—for tinning. And you'll be entirely free from concern about the sanitary condition of your foods.

Furthermore, the smooth interiors of "Wear-Ever" Utensils can be kept clean with a minimum of effort, for the utensils are all made seamless.

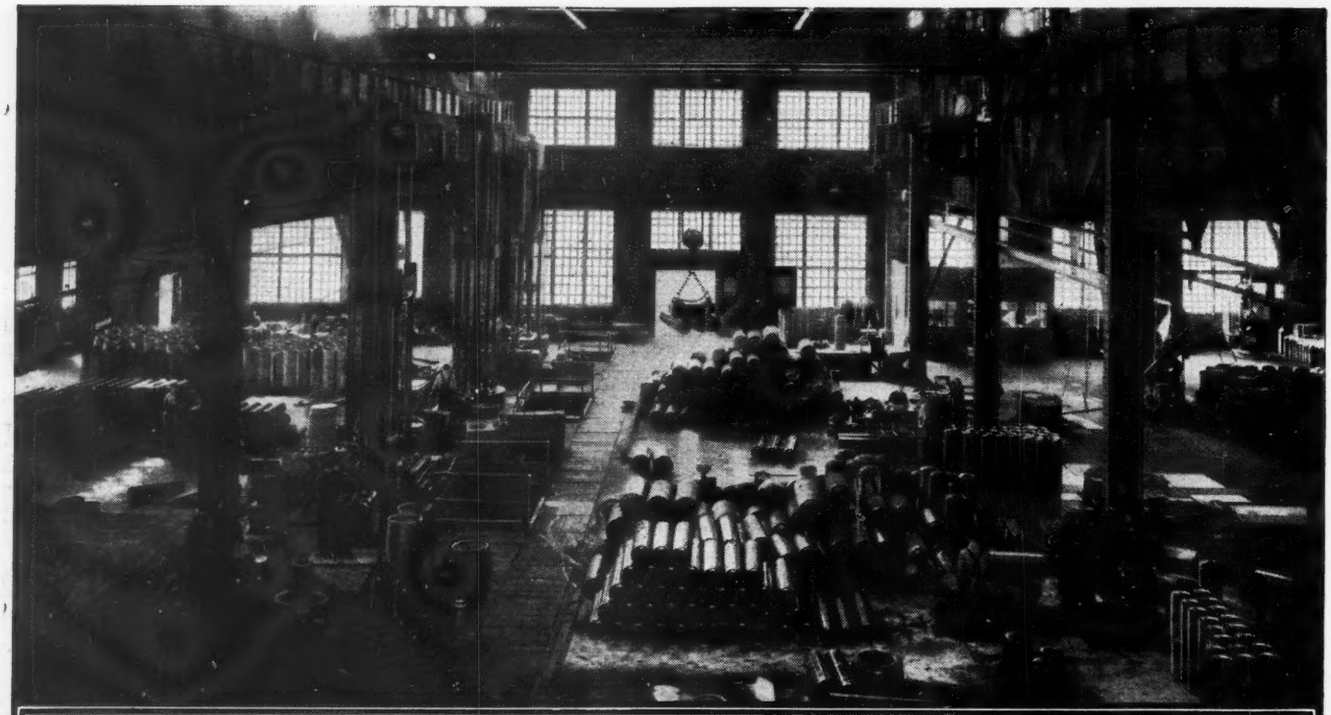
Another vital advantage of "Wear-Ever" Utensils for handling food is their lightness. And as they are made from hard, cold-rolled sheet aluminum, you can depend on all "Wear-Ever" Utensils to give service under long, hard use.

Write for the "Wear-Ever" booklet on Heavy Duty Aluminum Ware. Address THE ALUMINUM COOKING UTENSIL COMPANY, Desk I, 400 11th Street, NEW KENSINGTON, PENNSYLVANIA.

"Wear-Ever"

ALUMINUM COOKING UTENSILS

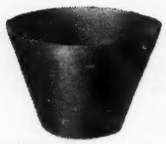
THE STANDARD—MADE OF THICK, HARD SHEET ALUMINUM



DRAWING SHAPES IN STEEL *CORRECTLY*

Hackney has specialized on deep drawn seamless containers for 30 years—knows how to make them correctly.

In the department, partially shown above, huge presses draw the shells—correctly. In the furnaces, partially shown below, the drawn shells are heat treated—correctly.



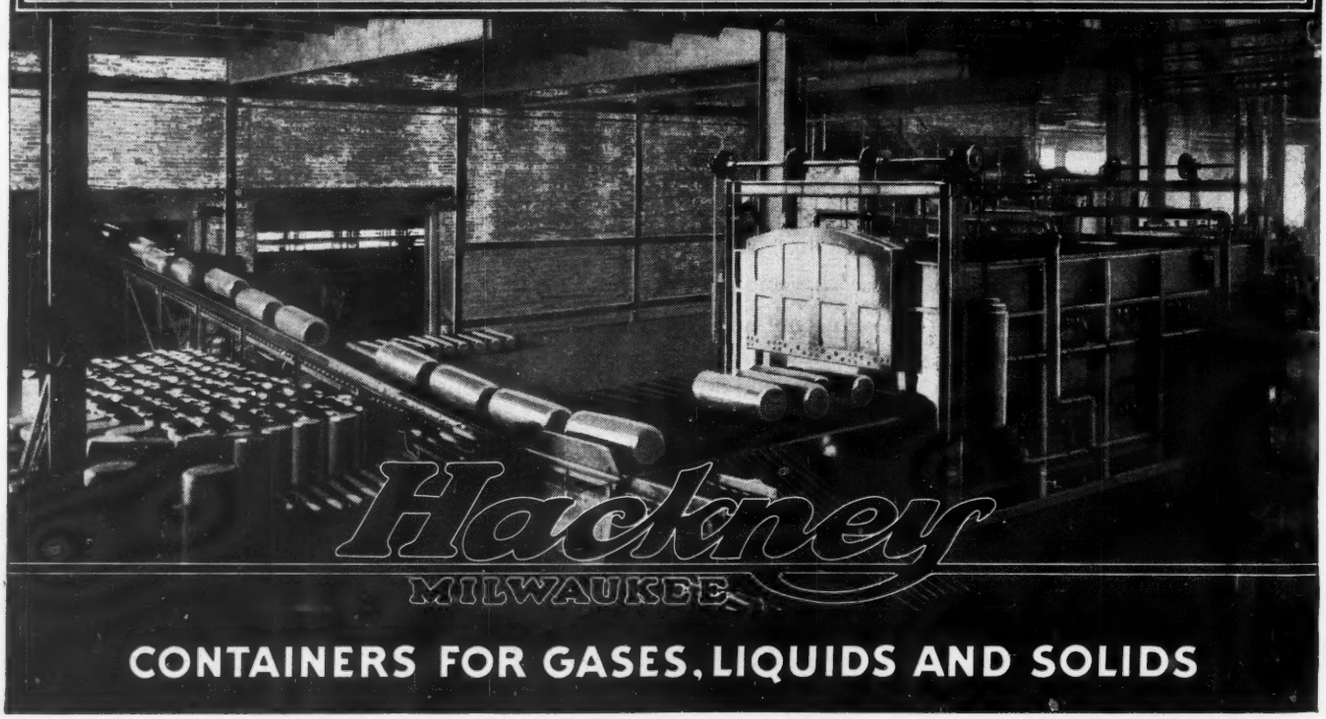
A specially built shape—formed of one continuous piece of steel.

The result is, seamless metal tanks, barrels, cylinders, special shapes, that resist abuse, give longer service and mean lower annual cost.

Hackney can solve unusually difficult forming problems, in a wide range of metals. If your company uses metal containers—write for the details—today.

PRESSED STEEL TANK COMPANY

1173 Central Republic Bank Bldg., Chicago, Ill. - 6601 Greenfield Ave., Milwaukee, Wis.
1349 Vanderbilt Concourse Bldg., New York - 477 Roosevelt Bldg., Los Angeles, Cal.



CONTAINERS FOR GASES, LIQUIDS AND SOLIDS

Air is going to WORK!

Measured by its possibilities, the scientific use of Air in Industry is only in its infancy.

New methods of manufacture, new processes, new industrial finishes, even new materials — all these are dependent to a great extent upon the successful handling of AIR.

From now on, the manufacturer who intends to stay abreast of his industry will consider carefully the cost-reducing possibilities of AIR, properly harnessed.

We offer you the services of an experienced body of engineers, second to none in the world in this field,—for assistance in the solution of your problems.

Branch engineering offices in all principal cities.

Buffalo Forge Company
501 Broadway, Buffalo, N. Y.
In Canada: Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo" for Heating—Cooling—Drying—Conveying—Purifying

New Tests on Jacketed Kettles Point to Important SAVINGS—

Contrary to opinion among some production men the proper application of a steam trap to a jacketed kettle may both improve the operation of the kettle and materially reduce the steam consumption. Until recently, little was actually known about why some traps work satisfactorily on such jobs and some do not. We undertook extensive tests to find out, and now have data on which to base dependable recommendations.

The test results are too voluminous to be even summarized here. However, two conclusions stand out clearly. First, traps do not retard cooking time. Any apparent bad effects from trapping can now be positively charged to incorrect trapping. Second, the importance of air removal in trapping jacketed kettles has never before been fully understood.

No one has ever questioned that cracked valves waste steam. Since proper trapping can give just as good or even better cooking results, there can be no reason for not making this saving in fuel. Your nearest Armstrong representative can make specific money-saving recommendations. There is no obligation involved in asking us to have the representative call.

ARMSTRONG MACHINE WORKS
866 MAPLE STREET, THREE RIVERS, MICH.
STOCKS IN ALL PRINCIPAL CITIES

FI 12-Gray

This advertising started wit the depression in 1929 . . . . . R

Easy to prepare
Kills mold and rope infection
Keeps equipment sweet-free
Add direct to water if desired
TO ELIMINATE MOLD...AVOID THE DANGER OF ROPE...use HTH-15
The MATHIESON ALKALI WORKS Inc. 250 PARK AVENUE, NEW YORK, N. Y.
FOOD INDUSTRIES — July, 1932
A new, easy way to CONTROL BACTERIA
HTH-15 will keep your plant and equipment SAFE . . . help prevent product spoilage
FOOD INDUSTRIES — September, 1932
23 BLUE VALLEY CREAMERY CO. plants get efficient sanitation with HTH
FOOD INDUSTRIES — August, 1932
FIGHT MOLD WITH HTH-15
New low-cost germicide kills mold . . . and prevents rope infection in bakeries
MAIL TODAY
FOOD INDUSTRIES — October, 1932

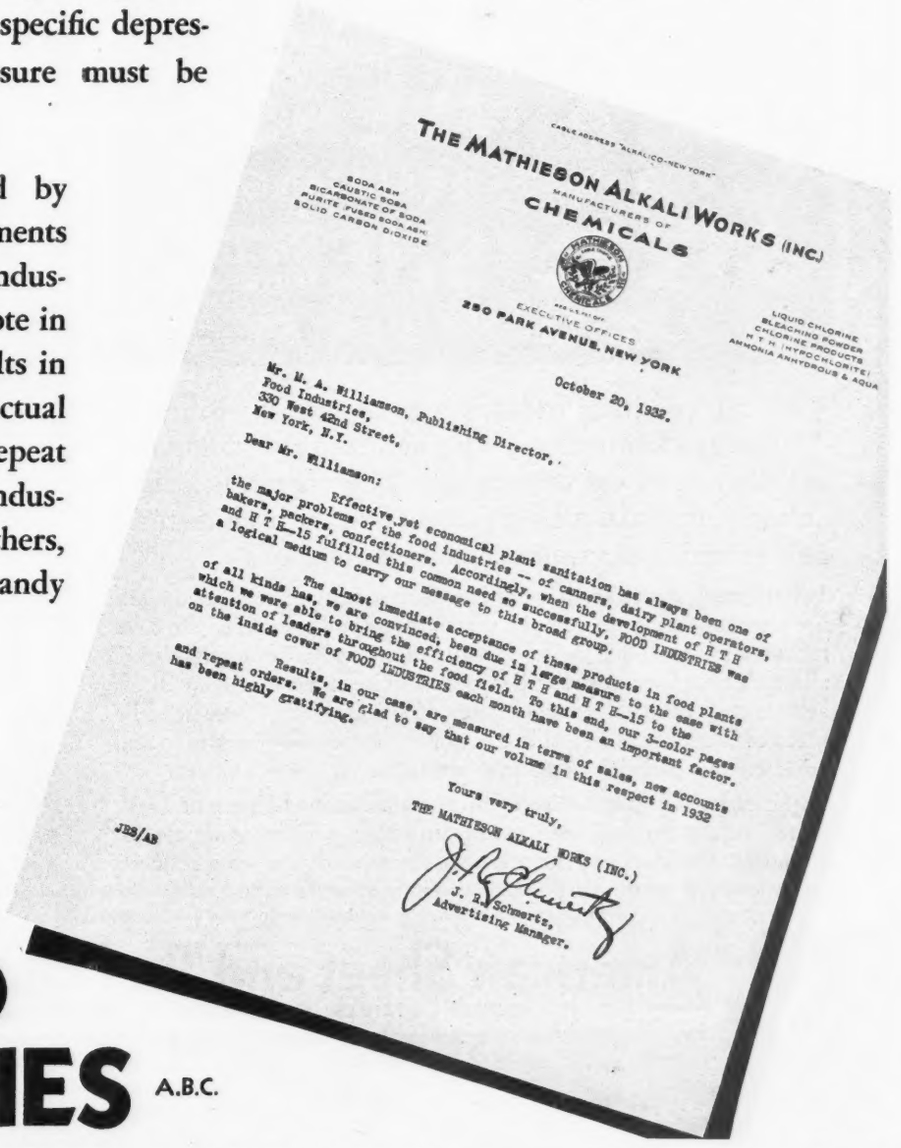
The above are recent advertisements appearing on the inside front covers of Food Industries in three colors. Handled by Marschalk and Pratt, Inc., New York advertising agency.

. . . RESULT . . . Mathieson ahead of the depression in 1932

October, 1929! That was quitting time for the faint hearted. But it was starting time for The Mathieson Alkali Works. Here was a manufacturer who recognized earlier than most manufacturers that to keep the general depression from becoming a specific depression increased selling pressure must be exerted.

Pages and inserts followed by three-color cover advertisements were used regularly in Food Industries—are still being used. Note in Mr. Schmertz's letter the results in terms of not inquiries but actual sales — new business and repeat business in a spread of food industries that embraces among others, canning, baking, packing, candy and dairy products.

All of which means what? The right market, the right advertising medium, the right kind of a schedule—and a product that meets the needs of food manufacturers.



THE MATHIESON ALKALI WORKS (INC.)
MANUFACTURERS OF
CHEMICALS
EXECUTIVE OFFICES
250 PARK AVENUE, NEW YORK

October 20, 1932.

Mr. M. A. Williamson, Publishing Director,
Food Industries,
330 West 42nd Street,
New York, N.Y.

Dear Mr. Williamson:

Effective yet economical plant sanitation has always been one of the major problems of the food industries -- of canners, dairy plant operators, bakers, packers, confectioners. Accordingly, when the development of H T H and H T H—15 fulfilled this common need so successfully, FOOD INDUSTRIES was a logical medium to carry our message to this broad group.

The almost immediate acceptance of these products in food plants of all kinds has, to a large measure to the case with which we are convinced, been due in the efficiency of H T H and H T H—15 to the attention of leaders throughout the food field. To this end, our 3-color pages on the inside cover of FOOD INDUSTRIES each month have been an important factor.

Results, in our case, are measured in terms of sales, new accounts and repeat orders. We are glad to say that our volume in this respect in 1932 has been highly gratifying.

Yours very truly,
THE MATHIESON ALKALI WORKS (INC.)
J. E. Schmertz,
Advertising Manager.

JES/AB

FOOD INDUSTRIES A.B.C.

A McGRAW-HILL PUBLICATION » 330 West 42nd Street » New York, N. Y.

There are Very Definite Uses for

AMERICAN USS STAINLESS AND HEAT-RESISTING STEEL SHEETS AND LIGHT PLATES

THESE products find a natural adaptability in many modern fabrications, whether from the standpoint of utility or of ornamentation. The chemical, dairy, culinary, manufacturing, automotive and architectural fields furnish examples of such applications.

Where steel sheets are needed but neither steel of regular analysis nor copper-bearing steel will serve, engineers and operating men have recourse to the USS series of Chromium and Chromium-Nickel alloys. These vary in properties and likewise in cost. Taken all together, they have a very wide range of adaptability. Choice can be made of the formula best suited to any particular use—corrosion and other conditions being taken into account.

Inquiries regarding any application of Stainless Steel Sheets or Light Plates, or any product fabricated from either, will be given careful attention. Booklets and literature will be mailed you upon request.

Chromium-Nickel Steels *Austenitic*	Chromium-Alloy Steels *Ferritic*
USS 18-8	USS 12
USS 18-12	USS 17
USS 25-12	USS 27

USS Chromium-Nickel Alloy Steels produced under licenses of Chemical Foundation, Inc., New York; and Fried. Krupp A. G. of Germany

This Company manufactures a complete line of Sheet and Tin Mill Products for all known purposes

American Sheet and Tin Plate Company

GENERAL OFFICES: Frick Building, PITTSBURGH, PA.

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

American Bridge Company
American Sheet and Tin Plate Company
American Steel & Wire Company
Carnegie Steel Company
Columbia Steel Company
Cyclone Fence Company
Federal Shipbuilding and Dry Dock Company
Illinois Steel Company
National Tube Company
Oil Well Supply Company
The Lorain Steel Company
Tennessee Coal, Iron & R. R. Company
Universal Atlas Cement Company

Pacific Coast Distributors—Columbia Steel Company, San Francisco, Calif.

Export Distributors—United States Steel Products Company, New York, N. Y.

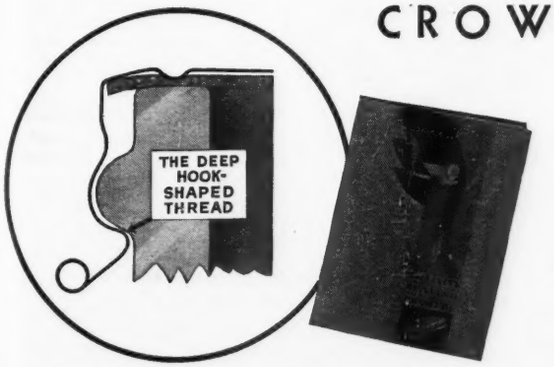
COMPLETE CLOSURE SERVICE

CONSIDER a single closure in its relation to your product. Upon it depends to a large extent your reputation and good will. Merely closing the container is not its only duty. It must seal and protect the contents under all conditions — must be easy to apply and easy to remove. It should harmonize with your package and add to its sales appeal.

Back of every C. C. S. Cap stand years of experience in the manufacture of closures—a complete modern Chemical Laboratory for the solution of sealing problems—a capable Art Department to originate cap designs—unsurpassed plant facilities to assure absolute accuracy in manufacture and make possible unlimited production—branch warehouses throughout the country for prompt and convenient delivery.

In every cap that leaves our plant is embodied all the experience, skill and facilities of this great organization. The C. C. S. name is your guarantee of complete and satisfactory closure service.

CROWN DEEP THREAD CAPS

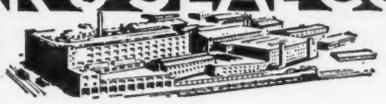


The deep hook shaped thread is an exclusive feature which assures positive sealing pressure, better protection for the product, easier application and easier removal.

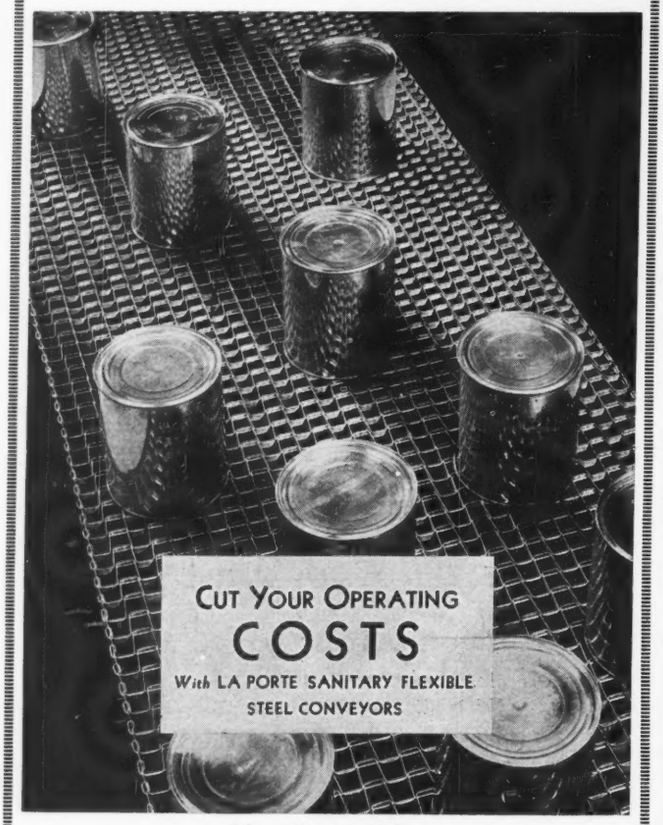
WRITE TODAY for a copy of this beautifully illustrated book which describes the deep hook shaped thread construction and the advantages it brings to the sealing of your product.

CROWN CORK & SEAL CO. Baltimore Md.

WORLD'S LARGEST MAKERS OF CLOSURES FOR GLASS CONTAINERS



It's all in the **CAP**



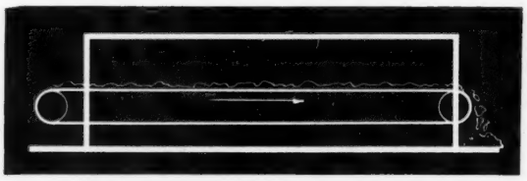
Manufactured by
LA PORTE MAT AND MANUFACTURING CO.
LA PORTE, INDIANA

DRYING
IN FOOD INDUSTRIES

Drying materials of many and widely different kinds, Proctor Drying Ovens are built in a variety of types, each the best for its specific purpose. Whether your product and scale of production would call for a small tray-type drying oven or a great continuous system, you will find Proctor engineers well qualified by experience to design the equipment that will give you maximum results . . . in quality of dried product as well as efficiency, control and economy of drying operation.

●

Among many continuous systems of conveying employed by Proctor Dryers, this single apron-type and companion multiple-apron types find many applications for the most efficient handling of materials through drying and similar processes. For information, write Dept. F.D.



PROCTOR & SCHWARTZ, INC
PHILADELPHIA

Handling Equipment of

INDURATED ALMO FIBRE

*Indurated FIBRE WARE

Resists corrosion . . .
Durable . . .
Costs 1/5 of alloys . . .

Don't confuse *Indurated* Fibre Ware with ordinary fibre ware. *Indurated* is made of compressed wood pulp—not paper. Its thickness is ¼ in. to ½ in. It is absolutely neutral . . . will not affect your products in flavor or color. For your needs . . . pails, tubs, measures, funnels and trays.

Indurated Fibre Ware resists food acids. Waterproof—unaffected by heat or cold. Highly glazed, easily cleaned. Can not rust, bend, warp or dent. Tough—just won't wear out.

Send trial order. Write for catalog and prices of complete line.

ALMO TRADING & IMPORTING CO., Inc.
61 East 11th St., New York City
Western Repr. E. L. Moore Co.,
742 S. San Pedro St., Los Angeles, Cal.

SilverStitch
REG. U. S. PAT. OFF.

GALVANIZED FINISH
Resists rust. Prevents unsightly stains or spots on cartons and inside packages.

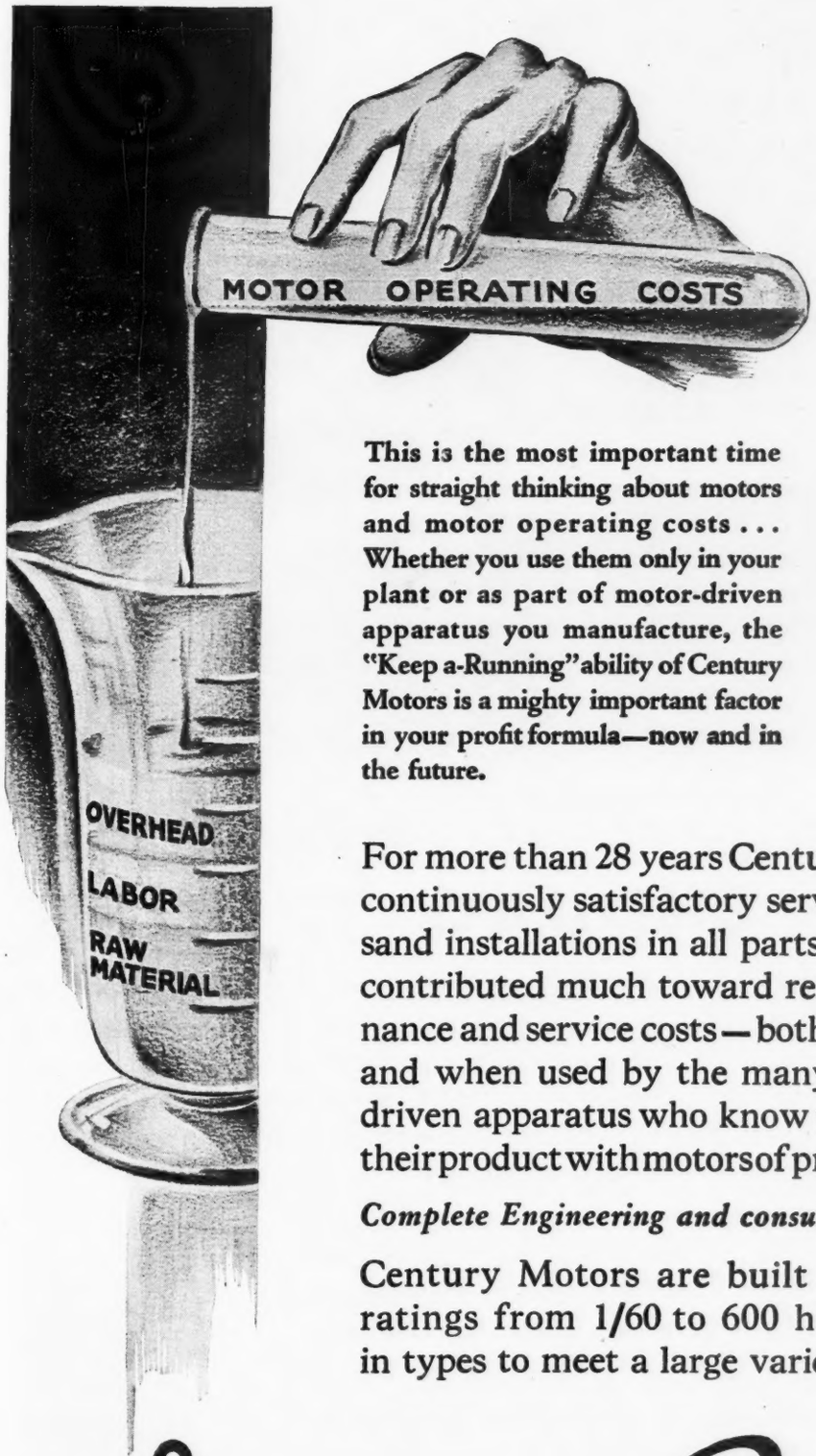
ACCURACY
In temper, width, and thickness assures smooth feeding through stitching machines and increased production.

ONE-PIECE COILS
Silverstitch is wound in continuous length five and ten pound coils. This feature saves many stops, and threading operations.

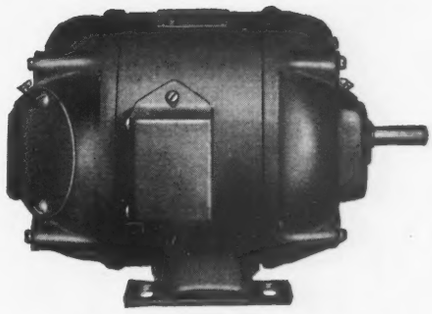
If you use stitching wire for closing your containers, send for a FREE five-pound coil of Silverstitch. Try it on your own boxes. See for yourself why this modern wire has grown so popular. Of course there is no obligation.

●

ACME STEEL COMPANY
General Offices: 2832-40 Archer Ave., Chicago · SAVE STEEL · Branches and Sales Offices in Principal Cities



This is the most important time for straight thinking about motors and motor operating costs . . . Whether you use them only in your plant or as part of motor-driven apparatus you manufacture, the "Keep a-Running" ability of Century Motors is a mighty important factor in your profit formula—now and in the future.



1/6 Horse Power Century Type RS Repulsion Start Induction Single Phase Motor—Brush Lifting Type.

For more than 28 years Century Motors have been giving continuously satisfactory service in many hundred thousand installations in all parts of the world . . . They have contributed much toward reducing production, maintenance and service costs—both in direct plant applications and when used by the many manufacturers of motor-driven apparatus who know the sales value of equipping their product with motors of proved reliability and long life.

Complete Engineering and consulting service instantly available.

Century Motors are built in standard horse power ratings from 1/60 to 600 horse power, 3600 R. P. M. in types to meet a large variety of uses.

350 Horse Power, 3600 RPM, Century Type SC Squirrel Cage Induction 3 Phase Motor.

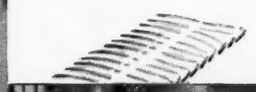
Century MOTORS

CENTURY ELECTRIC COMPANY, 1806 PINE ST., ST. LOUIS, MO.
Offices and Stock Points in Principal Cities

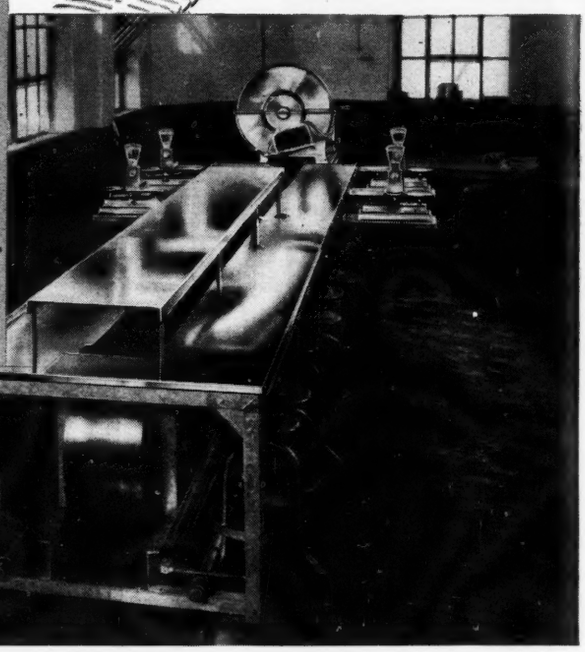
RS-15-1-6

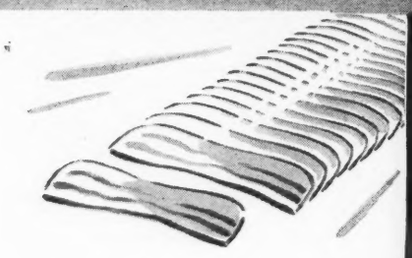
ALTERNATING AND DIRECT CURRENT, SINGLE PHASE, POLYPHASE, SPLIT PHASE, MULTISPEED AND SPECIAL MOTORS, RANGING IN SIZE—DEPENDING ON TYPE—FROM 1/60 TO 600 H. P. GENERATORS—MOTOR GENERATOR SETS—ACTODECTORS—BATTERY CHARGERS ETC.

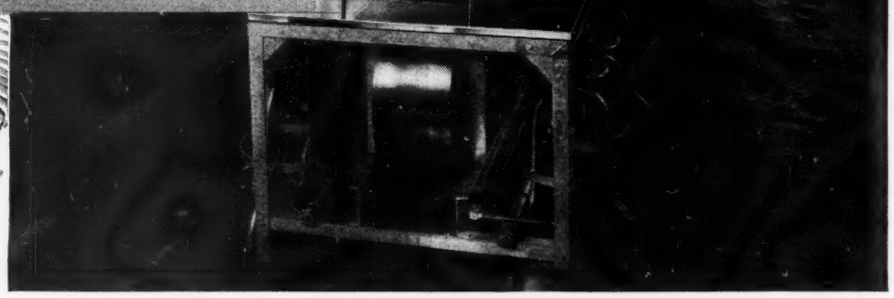
WITH THE AncO BACON SLICER,



AncO Bacon Slicer, manufactured by The Allbright-Nell Company, Chicago, Ill





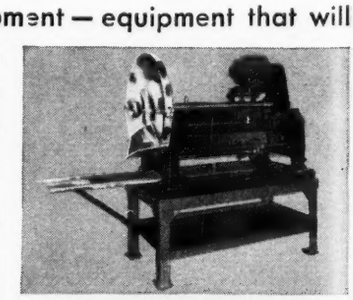


You get a lifetime

ENDURO TROUGH !

An outstanding feature of the AncO Bacon Slicer which has won the unqualified approval of alert meat packers is the stainless ENDURO trough. Made from Republic's perfected stainless steel, this trough will not rust, discolor, or impart foreign flavors to the meat. It will retain its lustrous appearance indefinitely, and can be kept scrupulously clean simply by washing.

If you want permanent, care-free equipment — equipment that will resist all attack from meat juices and keep its sparkling, sanitary appearance with minimum care, be sure that ENDURO is used for all meat handling parts.



ENDURO has received the approval of the U. S. Government for meat-packing service. It is available in all forms, and can be furnished to any degree of finish, depending on the application. Your fabricator will gladly give you full details, or write direct to Republic.

ENDURO
REPUBLIC'S
PERFECTED STAINLESS STEEL
ENDURO is sold only through Republic Sales Offices and Authorized Distributors

CENTRAL ALLOY DIVISION

REPUBLIC STEEL CORPORATION

MASSILLON OHIO

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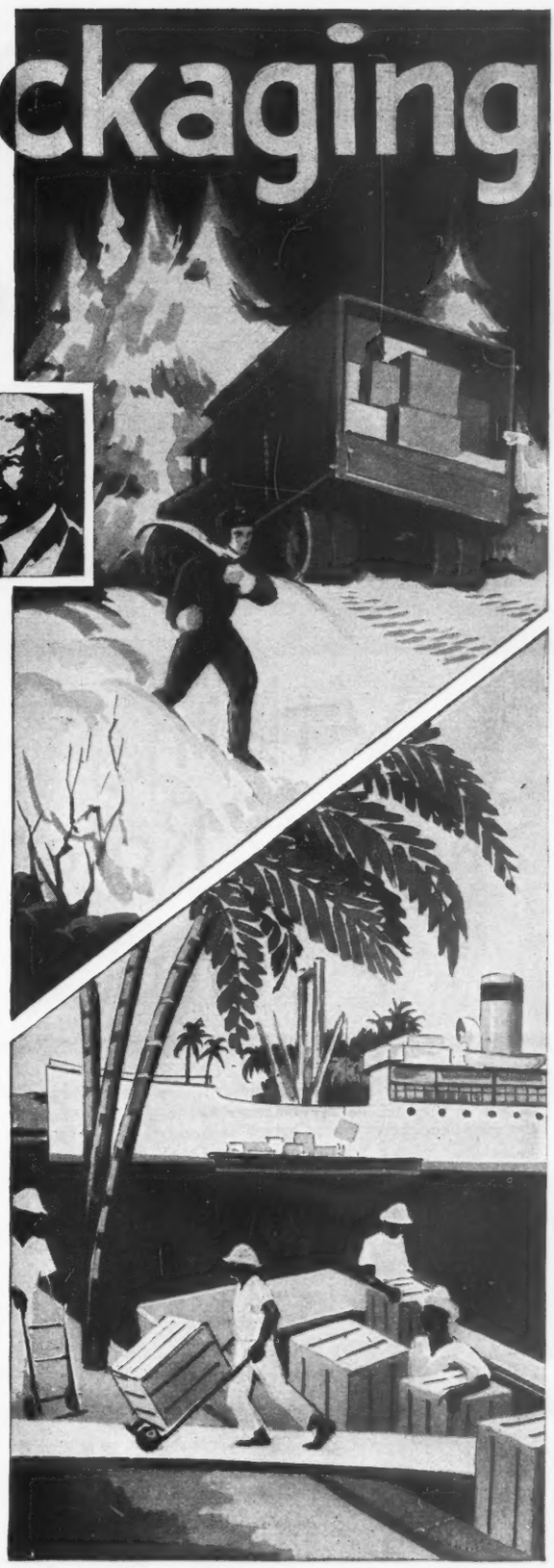
Patents Nos. 1316817 and 1339378

Proper Packaging

..a new science

"THE CLEVEREST MEN ARE THOSE WHO KNOW HOW TO TELL THE TRUTH"

Uncle Jake



What kind of a package should be used on cocoanut sold in Alaska? On fruits in England? On breakfast foods in Brazil? Or most important of all— on your own product in your own market? These and many other similar problems can readily be answered by the KVP Research Department, specializing in the new science of proper packaging.

KVP scientists have recently discovered new principles of packaging. These new packaging methods apply in YOUR field. They will help YOU to deliver your products to the consumer in fresher, better, more appetizing condition.

Send for "TRUTH," the interesting book that tells the story of modern food packaging. Find out how you can assure your products the utmost protection on their travels between your plant and the consumer's table. (Free.)

Kalamazoo Vegetable Parchment Company

Parchment (Kalamazoo Ccunty), Michigan

KVP PROTECTIVE PAPERS

economical

•• to buy... to install
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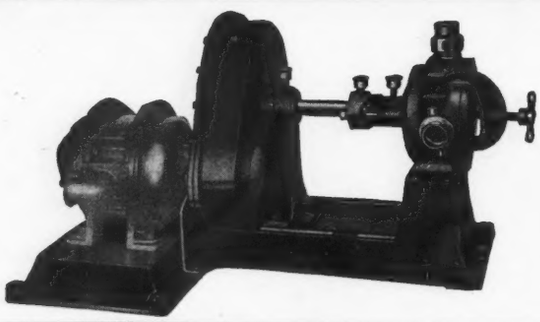

Viking Sanitary Rotary Pump

First of all . . the Viking Sanitary Rotary Pump is ECONOMICAL to buy. Quality and workmanship considered, it is the lowest priced pump in the rotary field.

Secondly . . the Viking is ECONOMICAL to install. The average mechanic can install it quickly and easily.

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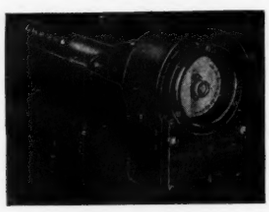

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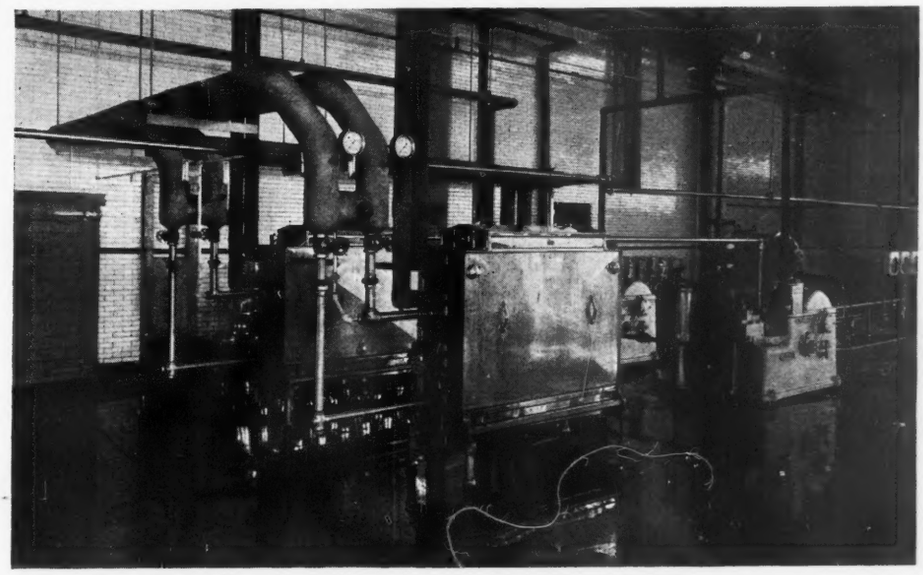
ANOTHER BIG PLANT ADOPTS

CHERRY-BURRELL CABINET COOLERS



Cherry - Burrell Cabinet Coolers, each of 10,000 lbs. per hour capacity, 2 Cherry-Burrell Pressure Filters and 2 Cherry - Burrell 1000-gallon Viscolizers on ice cream mix in the remodelled 141st St., New York City plant of the Reid Ice Cream Company, important Borden subsidiary.

REID ICE CREAM COMPANY

installs Cherry-Burrell system of Cabinet Cooling, Viscolizing and Filtering Ice Cream Mix in their remodelled New York City Package Plant

THIS organization, important New York subsidiary of The Borden Company, is noted for two things—the consistent, uniform, high quality of their product and the up-to-the-minute efficiency of their production processes. Important with Reid, as with all thoroughly modern ice cream manufacturers, is the economical delivery of the mix to storage at low temperature, well viscolized and completely free from all dirt or foreign particles. So upon the remodelling of their 141st Street, New York City, plant, in which is produced all the packaged ice cream for Borden subsidiaries in the New York metropolitan area, Reid installed a Cherry-Burrell system of filtering, viscolizing and cabinet-cooling their ice cream mix—two 10,000-lb. per hour Cherry-Burrell Cabinet Coolers, two Cherry-Burrell Pressure Filters and two 1000-gallon Cherry-Burrell Viscolizers. And as a further step in their economical achievement of thorough sanitation, finest quality, all sanitary fittings in this modern plant are Cherry-Burrell Diamond Metal.

THE RIGHT COOLER *for Ice Cream Mix*

Two features give the Cherry-Burrell Cabinet Cooler its remarkable cooling efficiency—FILM FLOW and SURPLUS SURFACE. As users of ordinary tubular surface coolers know, by feeding their products to such coolers slowly, by spreading it thinly over the tubes, they can accomplish colder cooling. But with ordinary tubular surface coolers this is impractical, too slow, too costly. In the Cherry-Burrell Cabinet Cooler, however, this thin flow over the tubes—a flow so thin that it is called FILM FLOW—is accomplished without sacrifice of speed or of economy. For in this new-day cooler, despite its compactness, its small size, there is SURPLUS COOLING SURFACE. In the No. 3309 Junior Model, for instance, there are OVER 972 LINEAL FEET OF COOLING SURFACE or the equivalent of a 2-inch surface cooler with *thirty* 12-ft. tubes. No wonder the Cherry-Burrell Cabinet Cooler has transformed the cooling of ice cream mix into a truly efficient operation. See for yourself just why this is so. Ask us to send you a copy of Bulletin No. G-175 and the names of many satisfied users. CHERRY-BURRELL CORPORATION, 427 W. RANDOLPH STREET, CHICAGO.

IN THE REID BULK PLANT, TOO

In their Brooklyn plant, where is produced the bulk ice cream for Borden's New York subsidiaries, is found the same Cherry-Burrell system of Cabinet Coolers, Pressure Cream Filters, Viscolizers and Diamond Metal Sanitary Fittings as in the New York City package plant.

AND IN THE J. M. HORTON PLANT

Another important Borden New York City plant is that of the J. M. Horton Ice Cream Company at 205 East 24th Street. Here, too, is a Cherry-Burrell system of Cabinet Coolers, Pressure Filters, Viscolizers and Diamond Metal Sanitary Fittings.

AND IN OTHER PROGRESSIVE PLANTS

Many are the plants which are turning to Cherry-Burrell Cabinet Coolers. Write for names of nearby users so you can see how these remarkable new coolers save space, cut costs, cool colder and faster.

It's time to stop

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Electronics

boasting *about that old suit*

Too many men who ought to know better are proudly telling how long they've worn the same old suit.

Too many men who could well afford to do better are boasting about the age of the automobile they drive.

It seems to be smart to be stingy.

But the same men are the first to protest when their prospective customers say "No" today. It's a case of the pot calling the kettle black.

Whether he makes machinery or match boxes, men's suits or motor cars, the business man today must concern *himself* with buying if he is successfully to concern himself with selling. If there's a reason for someone to buy from him there's a reason for him to buy from someone else. It's easy for a customer to ponder your own buying habits and say "me, too." Fact of the matter is that's what the whole world's been doing for the last two years.

There are indications that the procedure is at last getting into forward gear. In all walks of business people are taking advantage of low prices and are stocking up. Rock bottom levels are consequently being left behind. We seem to be approaching an era of advancing prices when things will have to be sold harder and at better prices.

So let's throw away our old suits. Let's throw away our old policy of patient but painful waiting. Let's buy some new clothes, new automobiles, new policies—yes, and even some new advertising, and begin to look normal again.

Your own salesmen as well as your customers would welcome the sight of your name in the advertising pages of McGraw-Hill publications. And so would your order books.

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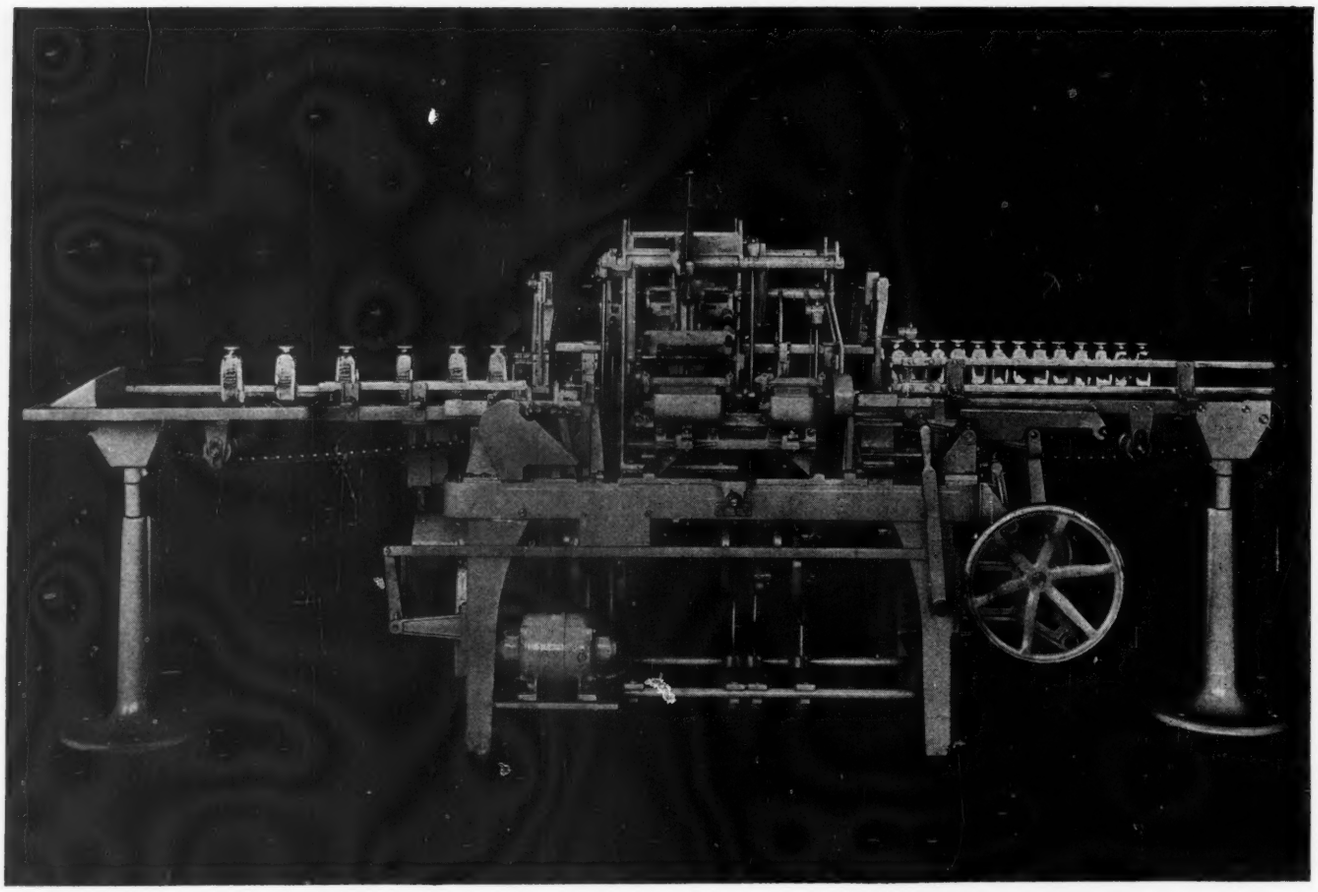

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The man who knows how to obtain knowledge on any subject at a moment's notice is one of the most valuable men in the plant. The men and firms listed in this section offer their services in a consulting capacity and their wide and varied specialties make this section a guide to which you may turn for assistance to cope with the various intricate problems that arise from time to time.

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reflect each issue the unremitting efforts of the editorial staff to keep readers fully informed as to WHAT, WHY, WHERE AND HOW.

To a limited extent, in the matter of describing new and improved materials and equipment, they also answer the uncertainty as to WHO but—

The *advertising* pages inform readers as to WHO makes or offers the products or services needed in following the best modern practice. Check them carefully, each issue—and include the FOOD INDUSTRIES SERVICE SECTION.

SEARCHLIGHT SECTION

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WANTED: By large meat canning industry, a man familiar with and thoroughly experienced in the preparation of canned food and sausage specialties. This will require a man who has the initiative and imagination necessary to enable him to produce new, attractive and palatable food products by various combinations of available meats. State education, experience and references when applying. P-132, Food Industries, 520 No. Michigan Ave., Chicago, Ill.

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100 to 400 gallon **Homogenizers** and **Viscolizers.**
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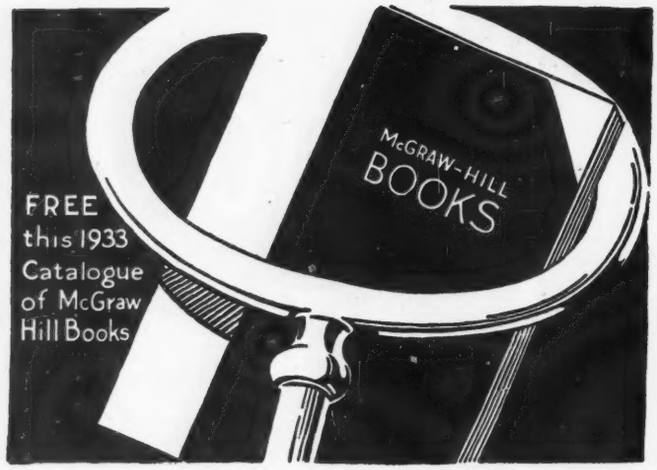

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ITS COLORS ARE FAST:

Vat dyes, the fastest wash fabric dyes known to science, are used throughout the broad range of colors. And Indian Head Cloth is sold with this most complete fabric guarantee:

If any garment made of Indian Head Cloth fails to give proper service because of the fading or running of Indian Head colors, we will make good the total cost of the garment.

IT IS DURABLE:

As evidenced by its outstanding choice for gymnasium suits, children's clothes. Rigid inspection at every step in making the Cloth safeguards its quality. In every department special markings tell from which machines each lot of goods has come, so that if flaws are revealed in later operations it is possible to trace the trouble back to the machines and operatives which are responsible.

IT IS ECONOMICAL:

A linen supply company of national prominence always specifies Indian Head Cloth in all bids. They base their rental business upon a life of twenty months' service for every garment and they make money. They report they know of no similar cloth which can be figured upon such low and positive replacement costs. There are definite savings for you if you specify Indian Head Cloth for women's uniforms.

Over 100 years of unfailing integrity behind Indian Head Cloth is the reason for the ready acceptance of any fabric or garment carrying the name Indian Head. *Insist on Indian Head Cloth whether you buy or rent your uniforms.*

Each manufacturer listed here is proud to sew this Indian Head label in his uniforms.

ANDERSON, IND.
The Ward-Stilson Co.

BOSTON
National Coat and Apron Supply Co.

CHICAGO
Angelica Jacket Co.
Northwestern Garment Factory
H. Woolf & Co.

LOS ANGELES
Angelica Jacket Co.
Edward Hyman Co.
Royal Mfg. Co.
Walco Garment Co.

NEW YORK CITY
Altro Work Shops, Inc.
Angelica Jacket Co.
Bruck's Nurses Outfitting Co.
Rosedale Hospital Uniform Co.

OGDENSBURG, N. Y.
Randles Mfg. Co.

PHILADELPHIA
The Bostwick Batterson Co.
Keystone Coat and Apron Mfg. Corp.

ST. LOUIS
Angelica Jacket Co.

ST. PAUL
Morrison Garment Co.

SAN FRANCISCO
Cowan Frank Mfg. Co.

SEATTLE
Nickols Mfg. Co.

TROY, N. Y.
Marvin-Neitzel Corp.

Nashua Mfg. Co.

Incorporated 1823

Box 1206, Boston, Mass.

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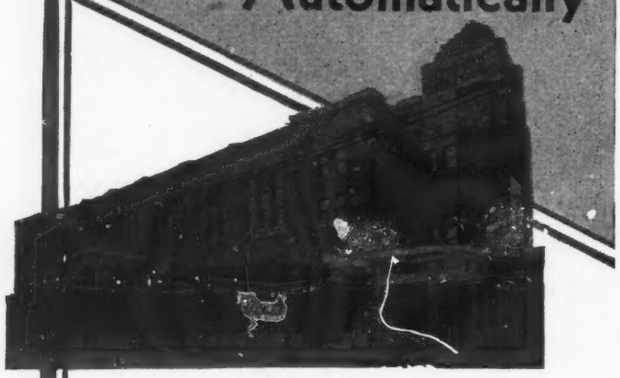

Illustration shows the St. James' Municipal Market in Montreal. This market is divided into a large number of individual stalls, each equipped with its own cold storage room, cooled by brine circulation which is controlled automatically by a

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The reason for the extreme accuracy of the Sarco, even at LOW temperatures, is that it is actuated by liquid expansion, which not only gives more power to operate the valve but has the same sensitivity at all points of the range from zero up.

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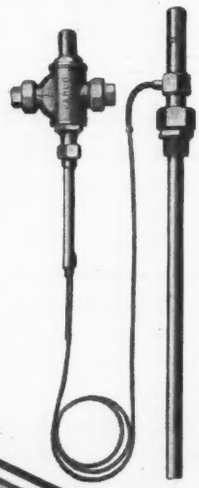

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